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SCOTTISH HOME AND HEALTH DEPARTMENT

HOSPITAL DESIGN IN USE

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The Falkirk Ward

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SCOTTISH HOME AND HEALTH DEPARTMENT

HOSPITAL DESIGN IN USE

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The Falkirk Ward

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PART I

I - INTRODUCTION

1.1. The detailed analysis of ward function in the Scottish Home and Health Department Planning Note on Ward Design* was based on a study of many types of acute ward unit by a multi-professional team between 1960 and 1962. Having described the basic functions, the Note went on to suggest what should be provided in terms of accommodation and services to meet these requirements; and from there to consider how a ward might be designed to express these in practical terms. The Supplement to the Planning Note described how such a design could be developed and tested.

1.2. While the Planning Note was being prepared, the Department decided to design and build a new ward as a major development project. With the co-operation of the Western Regional Hospital Board and the Board of Management for Falkirk and District Hospitals, this ward was built at Falkirk and District Royal Infirmary. The design was acknowledged to be only one expression of a given set of requirements and it was recognised from the outset that to complete the project, the ward should be evaluated in detail after being tested in use.

1.3. In brief, the design incorporated the following features which it was desired to test:-

(a) a deep, compact plan exploiting recent developments in lighting, heating and ventilation;

(b) a plan which would facilitate grouping together on the ward those patients requiring concentrated nursing care;

(c) an arrangement of accommodation and the provision of facilities to allow a high degree of flexibility in use;

(d) improved standards of privacy and amenity for patients.

These features, in a layout designed primarily to facilitate the work of the nurses, were expected to prove efficient in use and capable of meeting the inevitable changes which would occur in medical practice and nursing organisation in the foreseeable future.

1.4. A fundamental intention in the design of the Falkirk Ward Unit was to provide a higher standard of privacy and amenity together with improved facilities for patient care. It was hoped that standards for National Health Service hospitals might be set by a practical trial of this kind and that these would remain acceptable for many years to come. This entailed a complete departure from the Nightingale ward towards a comprehensive nucleus of nurse-working rooms centrally related to divided bed areas. The move which was then evident in other countries towards units composed of single or double-bed rooms could not be contemplated because of the high staffing levels and the increased capital and running costs that would be involved. A combination of four-bed rooms and single rooms was selected. For a standard acute ward, four beds to a room were judged to give significant advantages in privacy and social acceptability compared with higher numbers. A high degree of flexibility in use by both men and women patients could be anticipated and high occupancy rates might be maintained. For reasons which are later stated, the ward floor contained 60 beds, of which twelve formed an intensive nursing care area. This area could be reduced to eight or four beds, with a corresponding increase in the adjoining intermediate care area. Twenty per cent of the beds were in single rooms.

1.5. The detailed brief for the ward unit evolved as research and development work proceeded, and a draft schedule of accommodation was completed in April 1962. Thereafter, the timetable of the project was:-

1962	October	Revised sketch plans submitted
	November	Provisional estimated cost submitted
	December	Revised estimated cost agreed
1963	August	Lowest tender accepted Site work began
1964	June	Additional ward floor approved
1966	November	Ward Unit opened

1.6. Many different organisations were involved in this project, and the Department would like to express its grateful appreciation to the Western Regional Hospital Board and the Board of Management for Falkirk and District Hospitals for their co-operation. The Department is warmly indebted to the staff at Falkirk and District Royal Infirmary, and in particular to the ward staff, for their work in collecting an extensive range of factual information about the ward in use. Thanks are also due to the Scottish Hospital Centre for conducting the 24-hour survey, for assistance in collating their survey material and for help in many other ways; and to Messrs. Keppie, Henderson and Partners the project architects for their detailed co-operation with the planning team at all stages of the project.

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*Hospital Planning Note No. 1 Ward Design, H.M.S.O. 1963

II - THE METHOD OF EVALUATION

2.1. Before the first patients were admitted to the ward in December 1966, a list of the main operational features to be evaluated was drawn up. This is given in Section VI of this publication. To a considerable extent, the factual and statistical information collected by the ward staff during the initial months of working provide answers to the questions posed. The Department were anxious however to secure that the evaluation should be as thorough and authoritative as the time and resources available would permit. They appreciated that the number of workers with the appropriate professional experience in the analysis of ward units was limited, and that such individuals could not be expected to set aside the many other pressing demands on their time to make a detailed and lengthy study of the Falkirk Ward Unit. They therefore decided to approach the evaluation of the ward in three ways; by arranging for:

(a) the collection of factual information by the ward staff according to headings devised in consultation with the Scottish Hospital Centre, and the subsequent analysis of this information with co-operation from the Centre;

(b) a detailed 24-hour survey of nursing journeys in the ward by an experienced multi-professional group, and the preparation of string diagrams from the information collected;

(c) a two-day symposium to which a wide representation of interested individuals would be invited to consider and assess the material collected and to express views on the experiment.

2.2. The Department now present, as an evaluation of the Falkirk Ward Unit, the factual material collected and the record of the two-day symposium held in Edinburgh and at Falkirk on 6th-7th December, 1967.

III - THE PLANNING ASSUMPTIONS

3.1. It would be wrong to suppose that in the planning of a fundamentally new development in ward design there could be a clear-cut set of planning assumptions from the outset. The final shape of the Falkirk Ward, which includes many new features, developed over a period; it was not seen in all its detail from the start. In fact, the first proposition was to build a six-bed extension on to an existing ward in order to test a few features such as bed spacing, bed area furniture and the need for supplementary lighting in deep rooms.

3.2. The Falkirk Ward is the first building to incorporate the recommendations contained in the Scottish Home and Health Department Planning Note on Ward Design.* To understand the planning assumptions it is necessary to appreciate the thinking which led to these recommendations.

3.3. The survey work which led to these recommendations, and subsequently to the planning assumptions expressed in the Falkirk Ward, was undertaken by a multi-professional team consisting of a doctor, an architect, an administrator and a nurse. Some of the impetus for this study came from a visit to the U.S.A. by a group of officers from the Scottish Home and Health Department and the Hospital Boards in 1960. The team recognised also that much valuable work had been done by the Nuffield Provincial Hospitals Trust in the field of ward design, and that a great deal of information had been gained from the Nuffield experimental wards at Larkfield in Greenock and Musgrave Park in Belfast.

3.4. It was accepted that the design of a ward affects most directly the work of nurses. The patient's needs naturally have high priority, but these are substantially met if the nursing requirements are fully considered. Doctors' requirements too are important, but are more concerned with qualitative factors than with the shapes, sizes and groupings of individual rooms in a ward unit. It was decided therefore to study the work of nurses by day and by night in order to establish their requirements in detail. A study of this kind provided evidence of the nursing work being done. The team then had to rely on their own experience to assess how this work could be better organised and accommodated. This was not easy. Nurses were ready to improvise and "make do" in order to maintain a service in accommodation designed for very different procedures and forms of treatment from those which they were then being asked to provide. It was necessary therefore to isolate the real requirements of nurses and to relate these to trends which were beginning to emerge. This was the background from which the recommendations contained in the Planning Note emerged, and the planning assumptions of the Falkirk Ward developed from these recommendations. A deep or double corridor ward was used in order that the practical implications of a type of plan then being advocated elsewhere might also be tested. The ward was planned as one floor of a multi-storey block, and was in fact constructed as the first floor of a building, the ground floor being a new central operating theatre suite. Although it was built at a non-teaching hospital, the requirements for patient care in any ward do not change, and any extra accommodation required for teaching should not interfere with essential room relationships.

3.5. The team considered that a modern general ward should meet the following basic requirements:-

(a) it should improve the level of amenity and privacy afforded to patients;

(b) it should encourage a high bed occupancy rate;

(c) it should not be extravagant in staffing;

(d) it should be capable of being used flexibly since it will have to function for 50 years or more;

(e) it should aid the control of infection;

(f) it should meet the working requirements of nurses.

During the course of planning the Falkirk Ward, these basic requirements were recognised, and detailed surveys of many types of wards were continued to find out how such requirements could best be met. The main planning assumptions emerged as a clearer recognition of these basic needs, and many plans of the proposed new unit were prepared and scrutinised using the standard nursing-day technique as described in the Planning Note. Finally, design solutions were thoroughly tested by means of full-scale mock-ups.

3.6. The design of the Falkirk Ward was finalised in 1962. Its salient features can be summarised under the following headings.

Size of nursing charge

3.7. The precise number of beds was not specified at the outset. When the ward was planned, general nursing opinion seemed to be that a nursing charge should have no more than 25 patients. On the other hand, there was a growing opinion that individual nursing charges could be so organised that an administrative sister could control a greater number of beds and thus have a larger staff, which would enable her to deploy nurses

* H.M.S.O. 1963

according to the varying demand for nursing care within a unit. The planning team wanted therefore to find out if nursing charges could be so designed, and to test this large unit in action.

Grouping of patients

3.8. During the study work, the team became increasingly aware of the need to provide better accommodation for the care of the more acutely ill patients, and of the need to make the best use of skilled nurses and expensive equipment. To achieve this, patients must be grouped according to their degree of illness and to the extent of their nurse dependency. In the open type of ward it was the standard practice to group patients requiring most nursing care and observation in an area of the ward convenient for the night nurses or where oxygen points, etc. were available. The accommodation for such patients in a sub-divided ward was recognised to be of great importance.

3.9. It was necessary to find out how many patients required to be grouped in a special area within the ward unit. At the time of the study, "intensive care" units were beginning to appear in some hospitals. By and large, what was happening was that a very small proportion of patients from acute wards were being concentrated in one area of the hospital where they could have continuous medical and nursing observation, and probably treatment with special pieces of apparatus. This did not make it possible to reduce the number of nurses in any of the acute wards - although it did reduce the number of "special" nurses on demand throughout the hospital. It meant, in fact, that these new areas required to be staffed as well - usually by highly skilled nurses. Even when this group of patients was concentrated in one area of a hospital, a significant proportion of patients were left in acute wards who required continuous nurse observation and care, although not continuous medical observation. The team began to realise that "intensive care" had two components - intensive therapy and intensive nursing care. It was this second type of care which had to be catered for within a standard acute ward unit.

3.10. In order to justify the provision of a special area in a ward unit it was necessary to ensure that there were sufficient intermediate care beds to support such a unit. To allow this intensive nursing care unit to make effective use of staff, and to justify the provision of a separate set of ancillary rooms to serve the unit, it could not be too small. Several ward sisters were asked to record the number of patients requiring constant nurse observation in their wards over a period of time, and during the course of the study, the doctor and nurse members of the team assessed separately the dependency of the patients in each ward studied. From these records two main conclusions were drawn.

(a) The number of patients fluctuated greatly from day to day, or even from one part of the day to another, depending on admitting days and operating sessions.

(b) The number could vary from 12 per cent to 20 per cent of the total number of patients in any acute ward unit.

It was necessary therefore to plan for these numbers, and to have the unit designed in such a way that these beds could be used either for intensive nursing care or for intermediate care to allow for the fluctuating load if the unit was to maintain a reasonable bed occupancy throughout.

Grouping of beds

3.11. The planning team took account of the demand for a higher level of privacy and amenity than was being provided in open-type wards. This trend was being clearly demonstrated by the cubiclisation schemes then being carried out in existing wards. It was not known how many single rooms were required. The implications of providing a high proportion of single rooms were considered: these entailed an increase in the size of the unit, difficulties of patient supervision, problems of communication and the fact that the proportion of patients who might prefer a single room to a multi-bed room was not known. The "Nuffield" recommendation to provide 20 per cent to 25 per cent of the beds in single rooms was therefore accepted. This had been arrived at from a survey of how existing single rooms were being used for certain categories of patients. This survey was supported by their findings in their experimental wards. For this purpose, patients were classified in the following way:-

(a) those liable to infect others;

(b) those highly susceptible to infection;

(c) those seriously ill and dying;

(d) those likely to disturb others;

(e) those requiring special attention.

3.12. It was then necessary to decide how many beds should be provided in the multi-bed rooms. The American semi-private room containing two patients was not favoured because this could lead to under-usage if the patients were incompatible; nor were three-bed rooms favoured since they tended to become a "two and one" situation. Four-bed rooms were chosen because this arrangement afforded a corner to each patient, a location demonstrably preferred by most people, for example, in restaurants and trains. Larger bed areas always mean that one or more patients and their visitors are denied this advantage. It was accepted that a proportion of beds would be in single rooms and the remainder in multi-bed rooms of four beds. This decision was supported by the unanimous conclusions drawn at the International

Hospital Federation Congress in Paris in 1963 which state that "the wards must not have more than four beds".

Grouping of nurse working rooms

3.13. During the survey the planning team were concerned at the amount of time and effort spent by nurses looking for, collecting and preparing items of equipment for procedures. This preparation function was by far the most frequent procedure carried out by nurses in all the wards studied. The physical layout of ward units and the type of storage provided often obliged nurses to walk between four or five different points in order to prepare equipment for one procedure. Time was also spent searching for items of equipment because similar items might be stored in more than one place in a ward unit, not to mention the fact that these items were stored in widely different places in different wards, leading to confusion on the part of nurses who spent a relatively small proportion of time in each ward. This in turn often led to delay in the carrying out of procedures. Likewise, articles which had to be removed from the ward for re-processing or destruction were collected at several different points, leading to many unnecessary journeys.

3.14. After an analysis of all the preparation and disposal functions carried out in ward units, it was apparent that nursing procedures fell into the following distinct cycle of work:-

(a) an instruction was given or read;

(b) items of equipment were prepared or assembled;

(c) a procedure was carried out;

(d) items of equipment were re-processed and returned to storage points or else deposited for collection;

(e) the procedure was recorded or reported.

This led to the conception that all storage and preparation functions should be centralised within one area, and that another area should be provided for the temporary storage of articles to be removed from the ward.

3.15. The possibility of providing only one disposal area on a ward floor was considered. This, however, would still have meant that items would be held at several points on the ward, and only at intervals removed to a remote central disposal point. In effect, this increased the probability that nurses would be doing portering duties and would still be walking between disposal points within the ward. In order to minimise the amount of walking by nurses, these preparation and disposal areas should be located centrally to the bed areas which they serve. Using the simple technique of applying a notional nursing day in the form of string diagrams to the plans of ward units of different sizes, it was found that the maximum number of beds which could be related to these nurse working rooms, without unduly increasing nurse walking distances, was 30. If effective grouping of patients was to be achieved and the acutely ill patients were to be accommodated in a separate area of the ward, it was essential for this group of beds to be served by its own set of nurse working rooms. This would prevent nurses from being absent from the bedside of acutely ill patients for unreasonably long periods of time while they collected or disposed of items of equipment in remote working rooms. The number of ancillary rooms was trimmed to the minimum in the ward unit in order to reduce the amount of nurse walking, to avoid difficulties in communication and the misuse of rooms. Every room would have a specific function (or functions) related to it and there would be no "unspecified" or "unlabelled" rooms.

Treatment room

3.16. Following their observations in their experimental wards, the Nuffield team considered that the preparation area, treatment room and disposal area should be "en suite". The planning team's studies however did not support this finding. By and large, the use of a treatment room is on an elective basis; it is always an under-used room and there is a closer relationship between the preparation area and the disposal area than between either of these and the treatment room. Many nursing procedures involve only the use of the preparation area and the disposal area since many more procedures are carried out at the bedside than in the treatment room. The treatment room was therefore considered as a patient area and not as a nurse working room. It was regarded as a single room to which a patient is taken for a specific period of time in order to be treated. It had, of course, to be located conveniently near to the storage of equipment and to the point of disposal for used items of equipment. In order to centralise the storage of equipment completely, it was agreed not to store any items in the treatment room, but to have equipment brought there either for single treatments or for complete treatment sessions. Though this would probably be an under-used room, its size and location should make it a useful room for initial history taking, for instruction of patients, and possibly as a single room for a night admission if no other single room was available, thus preventing disturbance of other patients in multi-bed rooms. Such multi-purpose use of this room called for an adequate ventilation system.

Flexible usage

3.17. If the best use was to be made of expensive new ward units it was essential that they must be

flexible in use. In order to achieve this, several factors had to be considered in the design.

(a) It was essential for the design to allow a high bed occupancy rate to be maintained.

(b) The use of bed areas within one unit by men and women and by patients of different specialties had to be achieved. This would make it necessary to make each bed-area as self-contained as possible.

(c) It was important to provide for the fluctuating load in the intensive nursing care area.

(d) The number of beds in the multi-bed rooms should be four.

Observation and privacy

3.18. We have for many years been accustomed to open types of wards and to the concept that the most effective nursing care of patients could be obtained if there was visual supervision of all patients in the ward. In the new divided wards, however, there had to be some compromise between the amount of privacy which could be provided and the amount of observation required. For this purpose patients could be divided into two groups.

(a) The acutely ill patients whose privacy had to be sacrificed to a certain extent in order that the maximum observation could be provided at this stage in their illness.

(b) The intermediate care patients who could be afforded more privacy, but at the same time were reassured by fairly constant nurse observation.

3.19. Since patients could be grouped according to their degree of illness in different areas of the ward, it followed that different levels of observation should be provided within these areas. Patients who required the maximum amount of observation should be accommodated in rooms which had glazing down to mattress level on both the corridor walls and possibly on the walls between the rooms. Patients who required more privacy and less observation should be accommodated in rooms with glazing down to nurse-shoulder level on the corridor walls only. In order to afford as much privacy as possible, all patients should be accommodated in enclosed rooms and not in open bays. For this reason various methods and devices available for nurse-patient communications were examined.

(a) Audio-communication systems by which patient can speak to nurse and nurse to patient were not favoured because they are complicated for both patients and nurses, they reduce the amount of nurse-patient contact, and, most important of all, can not be used by patients who are unable to speak to a nurse, for example, the confused or the more acutely ill patient. Mechanical systems are no substitute for personal supervision.

(b) The bell-buzzer system with a consol set installed at a nurse station assumes that a nurse is permanently stationed at the nursing station and this is not the case in our hospitals; or means a journey from some other point in the ward to the nursing station to establish the source of the call.

It was agreed to experiment with a directional light/buzzer system which could be seen and heard at all points in the ward. This system is described in Section V, paragraph 10.

Early ambulation

3.20. Early ambulation forms part of the treatment of most patients, and the design of a ward should facilitate this. Many patients observed during the study were allowed out of bed at a very early stage in their illness. They might have pieces of apparatus attached to them, for example, drainage or suction apparatus; for their short "up" period it was undesirable, inconvenient, and time-consuming to take them to a remote day room. On the other hand, unless space was allowed for an easy chair or a semi-easy chair within the bed areas, these patients had to sit by the side of their beds, and they got in the way of cubicle curtains and treatment trolleys, etc. Moreover, they did not appear to like being taken to a day room at this stage of their illness, away from other patients whom they knew, in order to sit with strangers. It was noted too that many patients could have been taken to the W.C. if this had been an easy procedure. If it meant however that they had to be helped into dressing gowns and slippers, wrapped in blankets, possibly helped into a sani-chair and taken along a ward corridor, it was easier to give bed pans, though much less desirable, indeed objectionable, from the patient's point of view. The one area that is of particular importance to a patient, apart from the comfort of his bed area, is the W.C. W.C. compartments opening off bed areas increase significantly the sense of privacy for patients, and have definite advantages in eliminating journeys for nurses both on behalf of patients and when accompanying them.

3.21. In many existing hospitals there is no place at all for patient's clothes which are therefore sent home. Since so many patients are allowed up for a large part of their stay in hospital it was thought that they might be more comfortable if they were allowed to wear their own clothes. This could be made easy only if the nursing staff were not involved in fetching and carrying clothing to and from patients. Patients, in fact, were reluctant to ask nurses to perform this service. In order to take some of the responsibility for the security of patient's clothing away from the nursing staff, the clothing storage should be within the patient's

immediate bed area, that is, within his cubicle curtained area so that no-one could have access to it without the patient's knowledge. Adequate storage accommodation at ward level would prevent the inconvenience of having relatives remove clothes on admission and return them in time for discharge. It might even make discharge slightly earlier if clothes were readily available.

Day space

3.22. In addition to some sitting space within the bed areas, there was still a need for some day space elsewhere to accommodate noisy activities, for example, television. A great deal of distress is caused to patients by the constant noise of television sets in bed areas. Large day/dining spaces are not popular with patients in acute wards. They tend to be exposed to passing traffic, they are cold, and patients have to be asked to go into them. A smaller day space, domestic in character, was felt to be more acceptable. It was considered there should be two day spaces, only one of which should have a television set. These rooms should be located within the area of nurse circulation so that nurses could observe patients in the day rooms without patients feeling that they are being constantly over-looked.

Central services

3.23. The planning team assumed that there would be improved central services in all new hospitals and that all non-nursing duties would be taken away from nursing staff. These services would include improved central supplies of:-

(a) linen;
(b) food, with a possible waitress service;
(c) C.S.S.D. packs;
(d) pharmacy items; and
(e) a central dish-washing service.

If possible, there should not be any need for indenting or stock-taking of supplies at ward level by nursing staff. Although the time involved in the actual clerical work associated with these procedures is small, the irritation and interruption factors are considerable and the whole adds up to a less efficient nursing service.

Noise reduction

3.24. Apart from the noise caused by people talking and walking about the ward, complaints about noise in hospital wards are widespread. A great many factors contribute to this noise, for example:-

(a) doors opening and shutting;
(b) stainless steel equipment, both fixed and portable;
(c) trolleys with castors which are too small to ensure smooth running;
(d) noisy electrical equipment, such as bed-pan washers and cleaning equipment;
(e) large, heavy sink plugs;
(f) dishwashing

All these factors were carefully considered in the design at Falkirk. For example, doors are provided in patient areas only where they are required to reduce sound transmission and to provide some degree of privacy, and here sliding doors are used (see Section IV, paragraph 16). Bed-pan destructors and disposable bed-pans are used instead of bed-pan washers. There is no stainless steel equipment. The ward has been provided with trolleys which have 4 inch castors and laminated plastic shelves. There is a system of central dish-washing.

Cross-infection

3.25. Open type wards, often overcrowded, with inadequate ancillary accommodation and few single rooms, make it difficult to prevent cross infection, and the design of a new ward should overcome some if not all of these disadvantages. By reducing the number of patients per room, by increasing the number of single rooms and using these for patients who were clearly infectious or liable to be infected, it was hoped to improve the situation. Segregation of patients could, of course, be provided for in these rooms only if they had their own sanitary facilities attached to them. By meeting the requirements of nurses in providing better ancillary accommodation located in the right area for the work to be done in them, and from them, good nursing techniques could be encouraged.

Relatives

3.26. It was agreed that facilities should be provided for relatives, and in particular those of acutely ill patients. In the older types of ward it is almost impossible for relatives to be interviewed in privacy by either the medical or nursing staff or by social workers and chaplains. Nor is it possible to find a suitable area for relatives to remain in a ward unit overnight. Such an area, with its related toilet accommodation, would probably be under-used, but nevertheless it would be very valuable for those in distress. It could be used as a room where death certificates could be issued and where the belongings of patients who had died could be handed over to relatives. Having small, self-contained bed areas, less restricted visiting would be possible, with the minimum of disturbance to the work of the ward.

Administration

3.27. A divided ward with a larger proportion of single rooms adds to the problems of management, communication, observation and cleaning. It would have been foolish to have designed a ward which consumed more nursing time than could be provided. Meeting the requirements of nurses would not necessarily imply that the number of nurses

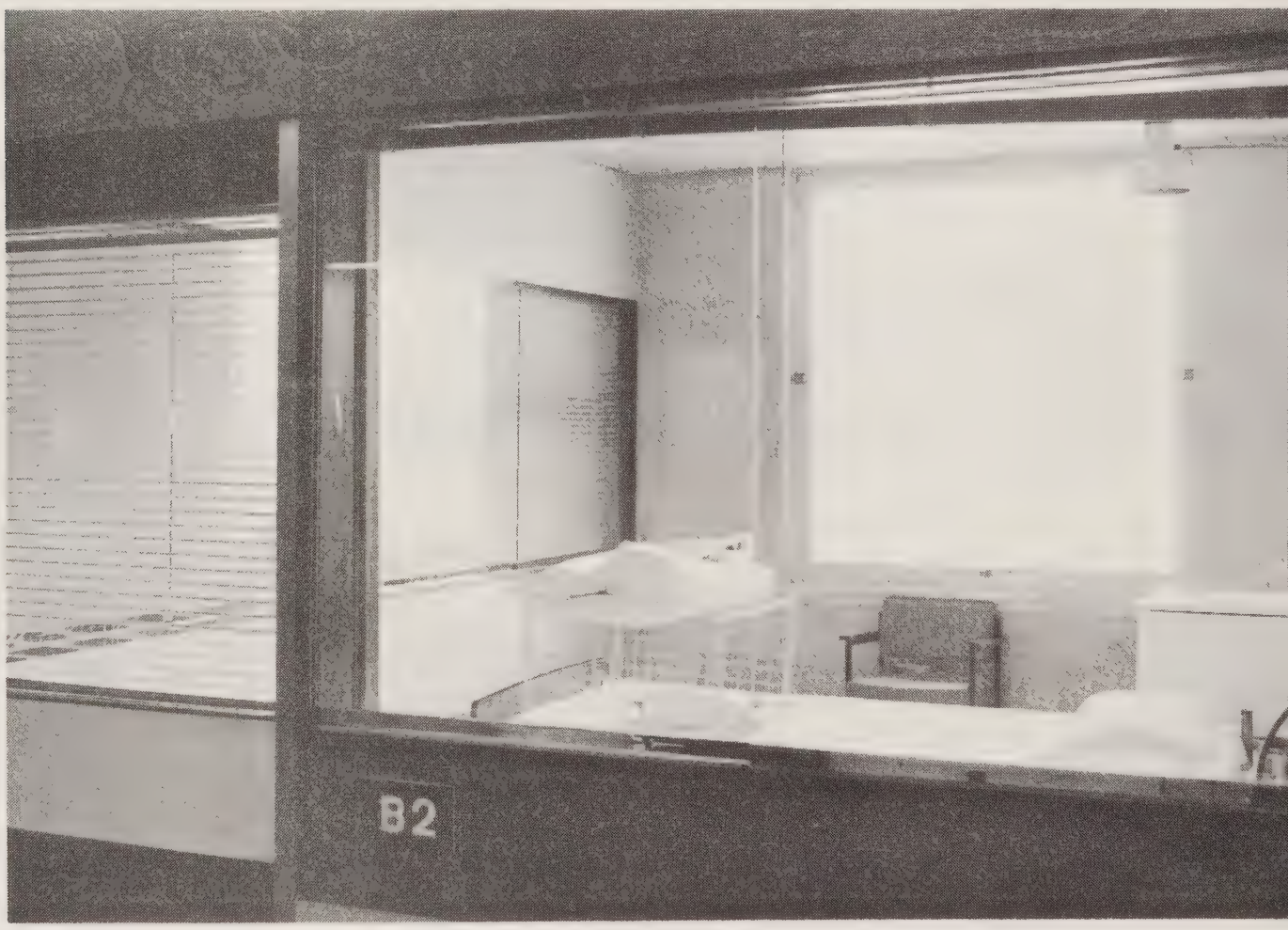
required to provide an adequate nursing service in the unit would be increased. By grouping the ill patients in a separate area and providing a larger ward unit, which in turn meant the provision of a larger staff, it was expected that a better deployment of staff within the unit would be possible. This entailed a considerable amount of movement within the unit both of patients and staff, which required a co-ordinator. This was one of the reasons why an administrative sister was put in overall charge of the unit. At the same time, it was thought that this type of a "manager" would relieve the ward sisters of some administrative jobs and enable them to undertake more clinical teaching of their student and pupil nurses. (This of course was long before the publication of the "Salmon" report, which subsequently provided authoritative backing for this concept). It was hoped that by meeting the needs of nurses to the fullest extent possible in other respects, the service could be improved in a sub-divided ward without unduly increasing the number of nurses required. Similarly, in relation to domestic staff, it was considered that the provision of a single domestic service room would facilitate team work, centralise the storage of bulky and expensive equipment and probably prevent duplication of this equipment.

3.28. It was intended that the consultants' office, a laboratory, the administrative sister's office, the interview/overnight-stay room and space for the ward receptionist would form a group which could suitably be located at the entrance to the ward floor. Situated together, and apart from the main patient-care areas, this would avoid the extension of nursing journeys within the bed areas, and facilitate staff communications and the arrangements for visitors.

Comment

3.29. While the 60-bed floor might be extended to allow larger intermediate care areas of 30 beds instead of 24 beds, which may be considered a slightly uneconomical nursing unit, and accepting that certain points of detail could be improved, the planning group would not wish to suggest a revision of the basic assumptions for a standard acute ward although the Falkirk Ward was planned and developed almost six years ago. These assumptions have now been tested in practice for over one year. The questions to be settled are whether the users and future planners consider these assumptions to have been justified.

A comprehensive preparation room supports the nurses' station in the intensive nursing care unit.



The view of a single room seen from the nurses' station in the intensive nursing care unit. Note the level of glazing which facilitates a full view of the patient.

The 4-bed intermediate care room, which incorporates some sitting space.

House Officer

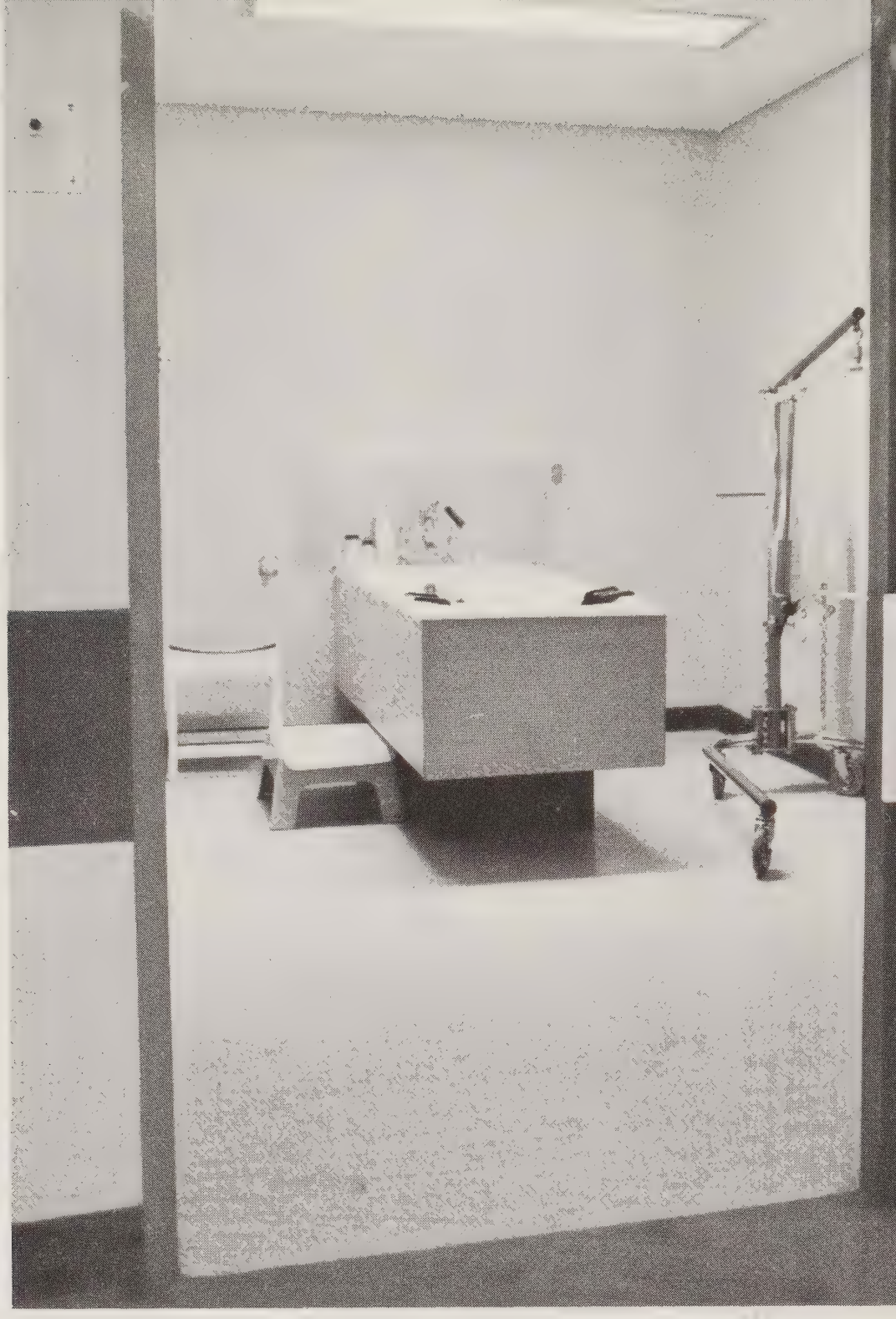
A single bedroom in the intermediate care section. The door in the corner leads to the W.C. and shower. (top left)

The nurses' station. The sisters' and house officers' rooms are placed so that they share easy access to the patients' record trolleys. (bottom left)

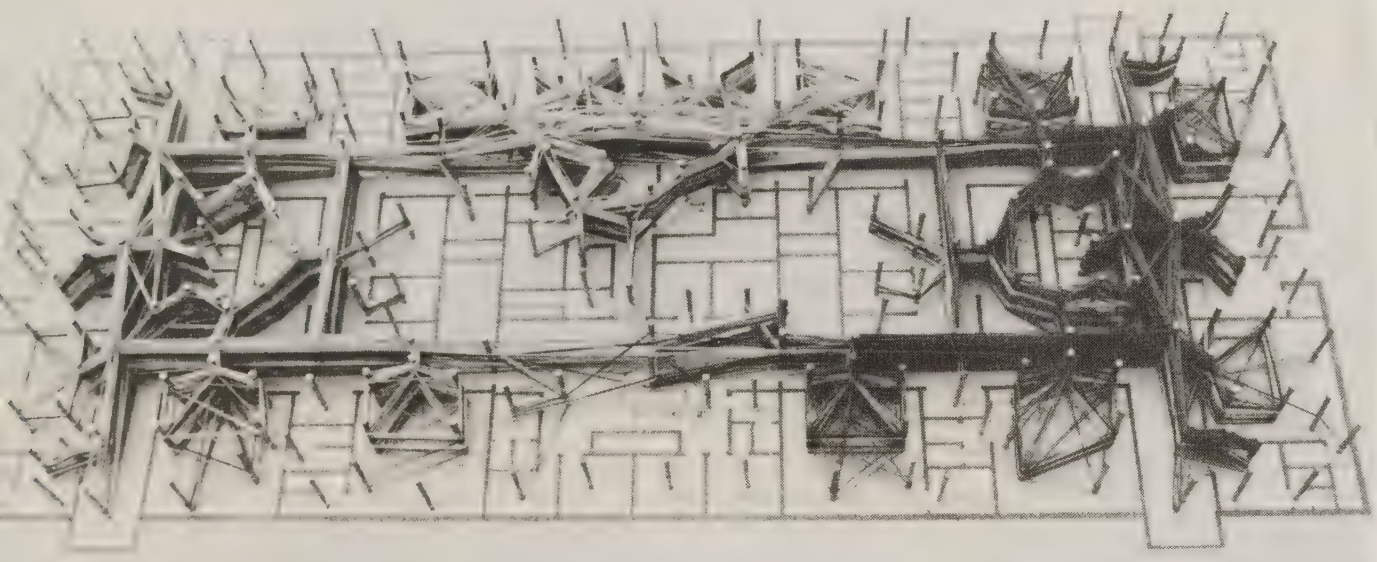
The W.C., shower etc., open directly off the bedrooms. There is a straight access to the W.C. for sani-chairs. Doors open outwards. (centre)

The base of the bath is recessed for the patient hoist. Mobile steps are cheaper and more convenient than built-in ones. (top right)

The corner of a 4-bed room. The curtain is hung on a ceiling track with high level net to admit air and light. The patient's wardrobe is within his curtained bed area. The bedside locker incorporates a flap which dispenses with an over-bed table. (bottom right)



The wide sliding doors facilitate bed movement. Full width glazing down to shoulder height gives good visual relationship between patient and passing nurse without too great an intrusion on patient's privacy.



String diagram of nurse journeys during a period of 24 hours.

There are bays in the corridors giving easily accessible storage for sani-chairs, mobile X-ray machine, telephone etc.

Preparation room with disposal room beyond. Dispensers for C.S.S.D. items are on the right (the treatment trolleys provide mobile work tops). Note open shelf storage of linen on the left (no separate linen room) and D.D.A. cupboard in the corner. Note that inaccessible space over storage units is blocked off, eliminating cleaning problems and the temptation to hoard.

Preparation room (left) and disposal room (right). The functions of these rooms are closely related in the basic cycle of nursing work.

Sluice room with disposal room beyond. Note disposable bed pans which are stored in cartons as packed by the manufacturer.

The small kitchen is amply big enough for its function. The hot meal trolleys does not enter the kitchen.

The treatment room is simple and uncluttered. Equipment is brought in on a trolley from the nearby preparation room.

The intensive nursing care, unit, showing the relationship of the nurses' station to the patients' rooms. The sister is checking the resuscitation trolley.

IV - ARCHITECTURAL FEATURES

4.1. The ward is an experiment in functional planning, and questions of structure, materials, finishes, compendium components and colour are of secondary importance.

4.2. The lay-out of the ward plan was the work of the Scottish Home and Health Department ward planning team; and doctors, nurses, administrators, architects and engineers pooled their knowledge to produce the plan. When this emerged, Messrs. Keppie, Henderson and Partners joined the team and from then on continued to work with the team until the completion of the project. This close and continuous contact was found to be very valuable.

Architectural scale and character

4.3. The low, compact building avoids any impression of an institutional character. The detailed architecture has been developed to increase the domestic character and to provide an environment where patients and staff can feel at home. The simple and direct lines of communication and the very few levels should help the users to orientate themselves quickly. From many positions within the ward it is possible to appreciate the outside spaces, the trees and the landscape. As many of the trees as possible were left standing, and the Board of Management have been able to landscape some of the surrounding areas.

4.4. The brick that was used has now mellowed, and the building fits the site well. Although no provision has been made to extend the ward vertically or horizontally, there is adequate space available for future development.

Internal environment

4.5. The concept of a compact building implies deep planning. That is to say, a large proportion of the floor area within the building must be, to a greater or lesser degree, remote from the external wall. It was necessary therefore to provide within this building a greater proportion of artificial internal environment than in a traditional building where natural light and air flow can be relied upon to produce acceptable conditions. The artificial environment within the deep plan is made acceptable by the installation of modern environmental services such as carefully controlled heating, mechanical ventilation and lighting.

4.6. There are other environmental factors necessary to basic human needs which influence design;

(a) privacy
(b) temperature
(c) ventilation
(d) cleanliness
(e) noise control
(f) general comfort

These points were all considered. The problem was to make the right decisions to plan the ward economically and satisfactorily; and in so doing to create an environment which would enable patients to be cared for with understanding and sympathy, give them and their families reassurance, and prepare them for a return to the community.

Structure

4.7. The ward has been planned as one floor in a hypothetical multi-storey ward block. At Falkirk, a four-theatre operating department was incorporated on the ground floor with the 60-bed ward on the first floor. A reinforced concrete frame with a structural grid of 22 feet was selected because of the planning considerations (in relation to the 4 bed-room ward). This structural grid lends itself to a flat slab floor construction without beams. The type of construction makes it possible to fix services directly to the underside of the structural slab at all points, but has the disadvantage that it is comparatively difficult to drill additional openings in the 10 inch reinforced concrete floor.

4.8. When the structure of the ward floor had been completed, it was decided to add an additional floor to the building, providing a second 60-bed ward unit to the same plan. Thus the building as finally developed had a basement containing services, a ground floor containing four theatre suites, and first and second floors each containing 60 bed ward units. Partitions were intended to be brick and plaster, but in order to accommodate the additional loadings, it was necessary to substitute lightweight partitions. A proprietary system was chosen which used metal framing clad with 2 layers of ⅜ inch plasterboard on both sides of the frame, with a glass wool quilt in the cavity, the joints between the plasterboard sheets being taped and filled with gypsum. This particular system was one of a number being investigated at the time by the Inter-Board Study Group, and it has since been developed and included in the Compendium of Hospital Building Assemblies.

4.9. The reduction in weight achieved by the lightweight partitions, coupled with the reduction achieved by the substitution of a light metal deck insulated by 2 inches of cork for a reinforced concrete roof slab, and the housing of the water storage tank in the basement service area, enabled the additional ward floor to be carried on the original foundations. The external walling is of cavity construction, outer cavity facing brick 14 inches long, and inner cavity concrete blocks of high insulation value.

Partitions

4.10. One of the main features of the partitions was that the 2½ inch void formed between the skins of plasterboard permitted the following services to be incorporated within the thickness of the partitions:

(a) medical gases;

(b) hot and cold water pipes;

(c) waste pipes from washhand basins;

(d) electrical conduits.

The architects have reservations about the partitions and the speed of their erection. At first it seemed straightforward, but the bends and angles and corners gave trouble and slowed the job down. This of course affects cost, and although the partitions were provided within the cost plan, this might not be possible again.

4.11. In the intermediate care areas, the corridor partitions of the multi-bed rooms and working rooms have full-width glazing above the level of 4 feet 4 inches. This was the level at which it was felt that a balance could be reached between privacy for the patient and the requirements of nurse observation. The decision to provide glazing in the corridor walls meant that sanitary facilities could not be situated on the corridor side of the rooms. It was accepted that the needs of observation justified the consequential lengthening of the building. To provide full observation within the intensive care ward area, the corridor glazing cill level is 3 feet. Sliding doors were glazed at the same level. The partitions between the bedrooms in the intensive care area were also glazed. These partitions were double glazed, and the glass on one face made to slide in order to facilitate the replacement of the curtains between the glass. The curtains slide on plastic tracks, cord-operated from the corridor side of the partitions. In practice, it has been found that the curtains between the beds were invariably left in the fully drawn position so as to obscure vision between the wards, and the partitions between the wards might have been solid in the first instance. The curtaining in the partitions to the corridor proved troublesome in the open position when the bunched material impeded observation. They have been replaced with narrow-louvred venetian blinds which have overcome this difficulty.

Windows

4.12. It was desired to avoid the difficulties (heat gain and loss, glare) associated with the extensive glazing featured in many recent hospital buildings, and care was taken to limit window sizes in accordance with day-lighting calculations. The proprietory windows are constructed in laminated red pine and contain two sashes each glazed with ¼ inch plate glass. Venetian blinds are fitted in the space between the sashes. The relatively large size of the opening part has given cause for second thoughts, but the windows are only intended to be opened on the few days every year when the external temperature exceeds 70° F. Otherwise, they are locked and the staff keep the keys.

Protection

4.13. Although all moveable items of equipment, beds, trolleys, etc., were to be provided with rubber bumpers or a similar protection, it was decided to protect the door openings and the exposed corners of the plasterboard partitions with metal angles. Melamine protective strips were also provided on the corridor walls and behind bed heads.

Ceiling finishes

4.14. Perforated metal stove enamelled ceiling tiles (14 inches × 24 inches) were used in the corridors and ward areas. These tiles, which have sound-absorbent properties, help to reduce the noise level and at the same time are readily demountable, if required, to provide access to the services contained in the void between the ceiling and the structural floor slab. At one stage in the design process, it was the intention to have a service floor, but the cost was prohibitive and so a demountable ceiling was installed. This helped to speed construction.

Floor finishes

4.15. 2 millimetre sheet vinyl with welded joints is used throughout the ward floor and this gives a feeling of continuity. The team would have preferred a more resilient floor with a foam back of some kind, but cost was a controlling factor.

Doors

4.16. The planning group were keen to incorporate sliding doors to the wards and treatment areas on the grounds that side-hung doors were frequently left open as an obstacle in the room to which they gave access; although doors were needed at night to give privacy in bed rooms. Moreover, improved sliding-gear was becoming available. The team decided to eliminate doors to certain working rooms in the core as it was felt that these would impede nurses in carrying out their duties. The main working rooms were actually fitted with doors but these were later removed. Fears about the noise disturbance from equipment in these rooms have not been realised and the open nature of the core goes a long way to compensate for the lack of view and daylight in the centre area.

Fitments

4.17. The fitments were designed and ordered before the Compendium range was available, but the draft notes on Compendium fitments that were ready at the time of the design were followed as far as possible. The fitments are tailored to the particular sizes of rooms and therefore differ in size from the Compendium fitments.

Colour/furniture/curtains

4.18. Proposals for the overall scheme of colour, loose furniture, curtains and carpets, etc. had to be framed within the standard cost limits set by the Department. The team did not try to be radical or too daring, but attempted to produce a simple, clean and inexpensive solution which was not too clinical in character.

Signs

4.19. The Compendium signs were used, and appear to have been successful.

V - ENGINEERING FEATURES

5.1. The Falkirk Ward was designed mainly with medical and nursing considerations in mind, and after the number of beds and the size and shape of the ward had been determined, it was agreed that there should be a limited amount of experiment in building and engineering. The challenge to the engineer was to devise the most satisfactory method of providing and accommodating the engineering services. Everyone concerned fully appreciated that the problems of planning in depth greatly influenced engineering services such as heating, mechanical ventilation and artificial lighting.

5.2. In 1961 there was little in the way of Planning Note or other guide material but there was an abundance of new ideas and theories, mostly expensive both in capital and running costs. It was obvious that if the unit was to be in some sense a prototype development, cost limits had to be accepted, and the engineer had to adopt a severely practical approach. The Department did not carry enough engineering staff to produce the detailed design, and the first engineering job was therefore to prepare a brief for the design engineer. Before this was done, however, the planning team had to make broad decisions in principle. The team studied a number of design details in other hospitals, carried out some research on their own, and then, with considerable help from the Building Research Station, set down the design principles. It might be appropriate to mention the terms of reference which determined the decisions taken. The principal features with which the experiment was to be concerned were:

(a) a deep, compact plan with the minimum of mechanical ventilation. The principal experimental aspect was to ascertain the extent of mechanical ventilation required, its control and cost, and the adequacy of mechanical ventilation without cooling;

(b) a high degree of privacy and amenity compatible with an arrangement of rooms and equipment to facilitate the work of nurses;

(c) the incorporation of a special intensive care area in the ward unit;

(d) a high degree of flexibility in use as between specialities, sexes, children and adults;

(e) permanent supplementary artificial lighting of interiors.

The standard of comfort for patients and the working conditions for staff had to be comparable with a conventional ward design, using natural ventilation and the minimum of artificial lighting.

5.3. The team considered the following aspects:-

(a) the site: the orientation of the building, elevations and exposures;

(b) the type of windows: size, openings, cleaning facilities and day-lighting factors;

(c) glazing: possible use of anti-sun glass, double glazing;

(d) protection against solar gain and glare: possible use of external shading, projectors or inclined windows and venetian blinds;

(e) heating: possible use of radiators, flush wall panels, ceiling heating, warm air heating; zones and controls;

(f) ventilation: possible use of natural ventilation in the ward area with mechanical ventilation in the core; full mechanical ventilation throughout; mechanical ventilation of the ward and air conditioning in the core;

(g) the varying intensity of artificial lighting required for corridor and internal rooms during day-time, evening and night-time periods, taking into account conditions of day-time natural light and evening artificial lighting in the bed areas.

They had to remember that the risk of airborne infection was to be minimised, and were thus obliged to think of a positive air-flow pattern, although there are no air locks in any part of the layout.

5.4. The brief to the design engineer laid it down that the west half of the unit would be heated by flush wall panels, and the remainder by ceiling heating panels, both designed to maintain a background temperature of 60°F. which would be supplemented by a warm air mechanical ventilation system in which the rates of air change and temperature could be adjusted to provide comfortable conditions relative to the time of year. The ventilation system is divided into zones, with independent controls, to provide the required conditions in the intermediate, the intensive care and the isolation rooms, and also in the treatment and nursing ancillary rooms in the core. No mechanical cooling is provided, but provision has been made in the design to allow it to be added for the core area only, if it is found to be necessary.

5.5. During the winter months and the greater part of the year, the intermediate bed areas are mechanically ventilated at about four air changes per hour, which can be increased to eight air changes per hour in warmer weather. In very warm weather it is necessary to open the windows, and these have been provided with a fixed control of the opening.

5.6. When the design of windows was being considered, it was agreed that the windows should be locked and the key held by the staff, although the duty of opening them might become so irksome that they might not always be adjusted when required; but with a too ready adjustment the system could become unnecessarily unbalanced.

5.7. The ventilation in the intensive care rooms, the single isolation rooms and treatment rooms can be set for positive or negative pressure.

5.8. There is no heating in the core; the ventilation rates are approximately 15 air changes per hour.

5.9. General lighting is mainly by fluorescent fittings, and the corridor and core rooms have constant artificial lighting. The continuous strip-lighting is recessed on the ward side of the corridor to prevent patients having a direct view of the lighting source. The lighting is set at two levels, one for day and one for evening to match the ward level intensities. There is also a third level for night lighting in the circulation area, and supplementary incandescent lighting with local switch controls in the working rooms in the core accommodation. These can be switched to dim or bright as required by the nursing staff.

5.10. The nurse-call system works in the following way. The patient presses a button on the hand set unit which lights up three points: first, a bulb at the patient's bed head; secondly, a light outside and above the room door and, thirdly the appropriate sector of a light in the form of a simplified corridor plan repeated in selected locations so that it is visible from all circulation spaces. The button also causes a discreet buzzer to sound. The nurse when so alerted can then trace the patient from the illuminated plan to the door to the bed - or to other patient locations, as the case may be.

Costs

5.11. Engineering services cost 50s. per square foot, that is, approximately 38 per cent of the total cost of the unit, and were made up as follows:-

heating	8/-
hot and cold water services	6/-
ventilation	20/-
electrical services	13/-
ancillary services	3/-

PART II

VI - OPERATIONAL FEATURES TO BE EVALUATED

The main operational features to be evaluated were identified before the unit was opened. They included:

(i) Experience gained from having an administrative sister based at ward level.

(ii) The extent to which the size of a nursing charge was affected by
(a) selective patient grouping,
(b) the more efficient organisation of supporting services.

(iii) The influence of layout and proposed nursing administration on
(a) the approach to patient care,
(b) nursing routines and the organisation of nursing work,
(c) training requirements.

(iv) The intensive nursing care area:
(a) its size in relation to the size of the ward floor,
(b) functional integration with the adjacent nursing charges and the responsibility for the movement of patients between the different nursing areas.

(v) The importance of planning for flexibility in use, and its contribution to high bed occupancy.

(vi) Use of various grades of nurse in teams; the possible introduction of a three shift system.

(vii) Internal rotation of nursing staff, including night duty.

(viii) Use of the duty stations:
(a) by day,
(b) by night.

(ix) Use of single rooms.

(x) Amount of clinical teaching of nurses that may be facilitated.

(xi) Use of the bathing, shower, washing and toilet facilities and their acceptability to patients.

(xii) Use of the various day areas and any effect in easing the transition from being bed-fast to ambulant.

(xiii) Amount of observation and conversely, when required, privacy which this layout allowed.

(xiv) Effectiveness of the patient-call system.

(xv) Use made of the treatment room, and effect of separation from preparation and disposal rooms.

(xvi) Effectiveness of replacing certain working-tops by trolleys (in preparation room).

(xvii) Use of sani-chairs.

(xviii) Value of locating patients' clothes lockers within the bed-curtain area.

(xix) Effectiveness of bed-curtains fixed at ceiling height and including a strip of netting material.

(xx) Effect on staff of working in internal rooms.

(xxi) Use of the interview/overnight stay accommodation.

(xxii) Contribution which this layout might make towards the control of cross infection.

(xxiii) Efficiency with which the procedure for the admission of patients could be carried out in the absence of an admission room.

(xxiv) Possible use of monitoring facilities in the intensive nursing care area (facilities for future provision have been included) .

(xxv) Degree to which noise control has been achieved.

(xxvi) Use of beds for the transport of patients (ease of getting in and out of rooms, etc.).

(xxvii) Acceptability of the heating, lighting and ventilating arrangements to patients and staff.

(xxviii) Effect of this degree of ward subdivision on:
(a) early morning routine (letting some patients sleep on),
(b) visiting hours (less restricted visiting).

(xxix) Integration with central services (linen, meals, dish-washing).

(xxx) Concept of storing of clean and sterile equipment (including linen) in the preparation room.

(xxxi) Level of staffing which proved necessary - in different grades.

(xxxii) Influence of this layout on domestic services.

VII - OPERATIONAL STATISTICS AND NOTES

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Work load

7.1. The work load can be estimated from Tables 1 to 4. The surgical operations and conditions requiring surgical intervention listed below formed the bulk of the theatre lists during the period under review. The division into "major" and "minor" is arbitrary. The allocation into either category was assisted by whether or not the patient required admission to the I.C.U. in the post-operative stage:-

Major Colectomy and hemi-colectomy
Abdomino-perineal excision of rectum
Gastrectomy
Jejunostomy with vagotomy
Cholecystectomy
Cholecyst-enterostomy
Repair of perforation
Strangulated hernia
Vagotomy and pyloroplasty
Volvulus
Appendicectomy with drainage
Intestinal obstruction
Sympathectomy
Thyroidectomy
Mastectomy

Minor Repair of hernia (uncomplicated)
Appendicectomy (uncomplicated)
Laparotomy
Haemorrhoidectomy
Colostomy and caecostomy
Abcesses/Ischio-rectal, breast etc.,
Excision of simple tumour
Biopsy
Orchidectomy
Circumcision
Skin graft
Sympathetic block
Endoscopy
Examinations under anaesthetic

Table 1 - Monthly totals of admissions

Month	Single rooms	I.C.U.	Multi-bed	Total
Feb. 67	15	24	102	141
Mar. 67	18	26	131	175
Apr. 67	12	28	109	149
May 67	22	30	106	158
Jun. 67	14	19	121	154
Jul. 67	20	29	104	153
Aug. 67	20	29	112	161
Sep. 67	25	30	88	143
Oct. 67	33	25	118	176

Table 2 - Bed occupancy

Month	Percentage occupancy of surgical charge of 80 beds	Percentage occupancy of 60-bed unit	I.C.U. beds occupied as percentage of total beds occupied	Number of days when I.C.U. was made up of:			Percentage occupancy of I.C.U. when made up of:		
				4 beds	8 beds	12 beds	4 beds	8 beds	12 beds
May 67	88%	88%	13%	10	15	6	90%	71%	77%
Jun. 67	92%	88%	14%	10	18	2	88%	90%	89%
Jul. 67	82%	83%	14%	9	21	1	95%	71%	79%
Aug. 67	79%	80%	13%	11	17	3	86%	63%	71%
Sep. 67	82%	83%	12%	11	15	4	90%	55%	67%
Oct. 67	91%	92%	15%	12	11	8	90%	88%	89%

Table 3 - Total number of operations

Month	Total	Male	Female	Major	Minor	to I.C.U.
Feb. 67	108	63	45	39	69	36
Mar. 67	121	73	48	45	76	36
Apr. 67	117	70	47	53	64	22
May 67	128	75	53	61	67	46
Jun. 67	157	89	68	58	99	42
Jul. 67	116	72	44	52	64	36
Aug. 67	145	86	59	56	89	41
Sep. 67	144	79	65	43	101	26
Oct. 67	161	91	70	74	87	55

Table 4 - Emergency operations

Month	Total	Male	Female	Major	Minor	to I.C.U.
Feb. 67	19	11	8	7	12	5
Mar. 67	36	19	17	7	29	4
Apr. 67	28	18	10	4	24	1
May 67	37	23	14	16	21	15
Jun. 67	34	20	14	14	20	9
Jul. 67	28	19	9	15	13	11
Aug. 67	33	19	14	13	20	13
Sep. 67	22	13	9	9	13	8
Oct. 67	26	18	8	10	16	10

Nurse staffing

7.2. (i) Table 5 shows for each month from February to October 1967 the average daily total of nursing staff employed in the ward and in each of the three units; and Table 6 gives the actual daily figures by categories for the month of June, which is representative of the period over which the statistics were collected. In addition to the staff recorded in the returns, there is one departmental sister who is responsible for the two 60-bed units in the ward block. A three-shift system is worked, as follows:

Shift 1 - 7.50 a.m. - 3.30 p.m.
Shift 2 - 1.00 p.m. - 9.00 p.m.
Shift 3 - 8.30 p.m. - 8.00 a.m.

(ii) The staff actually employed can be compared with the estimates originally made which are shown in the Appendix to this section (page 37). There it was estimated that 28 nurses and two ward sisters would be required as the basic staff for the 60-bed ward. To provide a basic nursing staff of 28 (i.e. a total of 28 nurses available for duty each day) a complement of 50 would be required. The actual number of nurses on duty each day (excluding sisters) has averaged 19.5 requiring a complement of about 35.

(iii) There have been two sisters on duty for part of each day. Thus against an estimated complement of 52 including two sisters, plus part of the time of a departmental sister, the ward has had in practice an actual complement averaging 38, including three sisters, plus part of the time of a departmental sister.

(iv) Table 7 shows for the purposes of comparison the numbers and categories of staff on duty over a 24-hour period in 13 ward units that were observed in the course of later ward studies. (In Table 7 the Falkirk Ward is represented by the first row. There happened to be 25 staff in all on duty in this particular period of 24 hours). It will be seen that the staff ratios observed range from one nurse to 1.85 beds down to one nurse to 4 beds. In June 1967 the ratio at Falkirk ranged from one nurse to 2.3 beds down to one nurse to 3.3 beds.

(v) The total nursing staff of the hospital (excluding midwifery staff) is 186 full-time and 63 part-time, and there are 306 general beds. 35 full-time and 16 part-time staff are allocated to the theatres and recovery area and the out-patient department, and 10 full-time and 1 part-time staff are engaged on teaching and nursing administration. There are thus 141 full-time and 46 part-time staff available for duty in the wards, equivalent to about 172 whole-time staff for the 306 beds. On average, this means about 34 staff for 60 beds, compared with the allocation of about 38 staff to the Falkirk Ward Unit.

Table 5 - Monthly staff summary (including sisters)

Average daily total of nursing staff employed

	Unit A	Unit B	Unit C	Total
Feb. 67	8 1	5.5	7 6	21.2
Mar. 67	7 3	6.0	6.4	19.7
Apr. 67	7 5	6.0	7.6	21.1
May 67	7.7	6.2	8.1	22.0
Jun. 67	7.6	6.4	7.9	21.9
Jul. 67	7.5	6.5	7.5	21.5
Aug. 67	7.8	6.2	7.4	21.4
Sep. 67	7.9	6.4	8.1	22.4
Oct. 67	7.6	6 6	8.0	22.2

Table 6 - Daily staff summary, June, 1967

(i) Unit A (24 Beds)

Date	Sisters	Staff Nurses	Enrolled Nurses	Student Nurses	Pupil Nurses	Nursing Auxiliaries	Orderlies	Total
1.6.67	1	-	2	2	1	2	-	8
2.6.67	1	1	1	1	2	2	-	8
3.6.67	1	1	1	1	2	1	-	7
4.6.67	1	1	-	2	1	1	-	6
5.6.67	1	1	2	1	1	2	-	8
6.6.67	1	1	2	2	1	2	-	9
7.6.67	1	1	2	1	1	3	-	9
8.6.67	-	1	1	3	-	2	-	7
9.6.67	1	3	-	1	-	1	-	6
10.6.67	1	1	-	2	1	2	-	7
11.6.67	1	1	-	2	2	1	-	7
12.6.67	1	1	1	1	2	2	-	8
13.6.67	1	1	1	1	2	2	-	8
14.6.67	1	1	1	2	2	2	-	9
15.6.67	-	1	1	1	2	2	-	7
16.6.67	1	2	1	3	1	1	-	9
17.6.67	2	2	-	2	-	2	-	8
18.6.67	-	1	-	3	1	2	-	7
19.6.67	-	1	1	2	1	2	-	7
20.6.67	-	1	1	3	1	2	-	8
21.6.67	-	1	1	3	-	2	-	7
22.6.67	-	-	1	3	1	2	-	7
23.6.67	-	2	1	2	1	1	-	7
24.6.67	-	2	-	2	1	2	-	7
25.6.67	-	1	-	3	2	1	-	7
26.6.67	-	2	2	4	1	1	-	10
27.6.67	-	2	1	3	1	1	-	8
28.6.67	-	1	1	3	1	1	-	7
29.6.67	-	1	2	2	1	2	-	8
30.6.67	-	3	2	1	1	2	-	9
								(Average 7.6)

(ii) Unit B (12 Beds)

Date	Sisters	Staff Nurses	Enrolled Nurses	Student Nurses	Pupil Nurses	Nursing Auxiliaries	Orderlies	Total
1.6.67	-	3	-	2	-	1	-	6
2.6.67	-	3	2	2	1	1	-	9
3.6.67	-	3	1	2	1	-	-	7
4.6.67	-	3	1	1	1	-	-	6
5.6.67	-	2	1	1	1	-	-	5
6.6.67	-	2	2	1	1	1	-	7
7.6.67	-	3	1	1	1	-	-	6
8.6.67	-	3	1	1	-	1	-	6
9.6.67	-	3	1	-	1	1	-	6
10.6.67	-	3	-	1	1	-	-	5
11.6.67	1	3	-	1	-	-	-	5
12.6.67	1	3	1	-	-	1	-	6
13.6.67	1	2	1	1	-	1	-	6
14.6.67	1	3	1	1	-	1	-	7
15.6.67	1	2	1	1	-	1	-	6
16.6.67	1	3	2	1	-	1	-	8
17.6.67	-	3	-	2	1	-	-	6
18.6.67	1	2	-	1	1	1	-	6
19.6.67	1	2	1	1	1	-	-	6
20.6.67	1	2	1	1	1	-	-	6
21.6.67	-	3	1	1	1	-	-	6
22.6.67	1	3	1	-	-	1	-	6
23.6.67	1	3	1	-	2	-	-	7
24.6.67	1	3	-	2	1	-	-	7
25.6.67	1	3	1	1	1	-	-	7
26.6.67	1	2	-	1	2	1	-	7
27.6.67	1	2	1	1	1	1	-	7
28.6.67	-	3	-	1	2	1	-	7
29.6.67	1	2	1	-	1	-	-	5
30.6.67	1	3	2	1	-	1	-	8
								(Average 6.4)

(iii) Unit C (24 Beds)

Date	Sisters	Staff Nurses	Enrolled Nurses	Student Nurses	Pupil Nurses	Nursing Auxiliaries	Orderlies	Total
1.6.67	1	1	1	1	1	2	-	7
2.6.67	1	1	2	2	1	1	-	8
3.6.67	-	1	1	2	1	1	-	6
4.6.67	-	1	1	3	1	-	-	6
5.6.67	-	1	2	2	1	3	-	9
6.6.67	1	-	2	3	-	2	-	8
7.6.67	1	1	2	2	1	1	-	8
8.6.67	1	1	2	2	-	2	-	8
9.6.67	1	1	1	2	1	2	-	8
10.6.67	1	1	-	3	1	1	-	7
11.6.67	1	1	-	3	1	1	-	7
12.6.67	1	1	2	2	1	1	-	8
13.6.67	1	1	1	2	1	2	-	8
14.6.67	1	2	1	1	1	2	-	8
15.6.67	-	1	1	3	1	2	-	8
16.6.67	1	1	1	2	2	1	-	8
17.6.67	1	1	1	2	1	1	-	7
18.6.67	1	1	3	2	1	-	-	8
19.6.67	1	2	1	4	1	2	-	11
20.6.67	1	1	1	2	1	2	-	8
21.6.67	1	2	1	1	1	2	-	8
22.6.67	-	1	1	3	1	2	-	8
23.6.67	1	2	2	1	1	2	-	9
24.6.67	1	2	2	2	-	1	-	8
25.6.67	1	1	-	3	1	2	-	8
26 6.67	1	1	1	2	1	2	-	8
27.6.67	-	1	1	3	1	1	-	7
28.6.67	1	1	1	2	1	2	-	8
29.6.67	1	1	1	3	-	2	-	8
30.6.67	1	2	1	3	1	1	-	9
								(Average 7.9)

Table 7 - 24-hour staffing in ward units

Type of Ward	No. of Beds	Sisters	Staff Nurses	Enrolled Nurses	Student Nurses	Pupil Nurses	Nursing Aux.	Total	Nurse/Bed Ratio
* Surgical	60	3	6	4	7	2	3	25	1-2.4
Medical	24	1	2	2	4	2	-	11	1-2.2
Surgical	52	3	2	3	8	-	4	20	1-2.6
Surgical	24	1	3	-	5	1	-	10	1-2.4
Surgical	19	1	-	-	2	1	1	5	1-3.8
Medical	30	1	2	-	7	1	2	13	1-2.3
Thoracic	27	1	5	-	5	-	3	14	1-1.85
Surgical	28	1	3	-	3	-	2	9	1-3.1
Surgical	32	1	-	1	3	-	3	8	1-4
Gynaecology	20	1	1	-	4	-	2	8	1-2.5
Surgical	35	1	3	1	5	2	1	13	1-2.7
Surgical	30	1	5	1	1	-	2	10	1-3
Surgical	52	2	4	2	4	3	-	15	1-3.46

*Falkirk Ward

Occupancy and flexibility in use of the 4-bed rooms in the intensive care area

7.3. The two 4-bed rooms, A 10 and C 10 are planned so that they can be used equally as part of the intensive care unit or as part of the intermediate care area. Tables 8 and 9 record the use made of these two rooms during the period from May to October 1967.

Table 8 - Use of room A 10

Month	Total bed/days available	Bed/days as I.C.U.			Bed/days as Intermediate care			Total bed/days used and percentages
		Male	Female	Total as percentage of bed/days available	Male	Female	Total of percentage of bed/days available	
May 67	124	18	-	14.5%	51	27	62.9%	96 (77.4%)
Jun. 67	120	31	14	37.5%	8	54	51.6%	107 (89.1%)
Jul. 67	124	15	7	17.7%	40	48	71.0%	110 (88.7%)
Aug. 67	124	8	8	12.9%	16	45	49.2%	77 (62.1%)
Sep. 67	120	2	22	20.0%	6	28	28.3%	58 (48.3%)
Oct. 67	124	42	16	46.8%	53	4	46.7%	115 (93.5%)
Totals	736	86	67	20.8%	174	206	55.6%	563 (76.4%)

Table 9 - Use of room C 10

Month	Total bed/ days available	Bed/days as I.C.U.			Bed/days as intermediate care			Total bed/ days used and percentages
		Male	Female	Total as percentage of bed/days available	Male	Female	Total as percentage of bed/days available	
May 67	124	21	45	53.2%	10	4	11.3%	80 (64.5%)
Jun. 67	120	17	20	30.8%	7	66	60.8%	110 (91.6%)
Jul. 67	124	43	13	45.2%	12	-	9.6%	68 (54.8%)
Aug. 67	124	45	16	49.2%	11	8	16.9%	82 (66.1%)
Sep. 67	120	39	12	42.5%	15	8	19.2%	74 (61.7%)
Oct. 67	124	1	38	31.5%	6	59	52.4%	104 (83.9%)
Totals	736	166	144	42.1%	61	145	28.2%	518 (70.3%)

Note: In the 8 months, March - October, 1967, the position at midnight (245 recordings) was that of the single rooms in the intensive care area:

1 bed was empty on 52 occasions

2 beds were empty on 16 occasions

3 beds were empty on 1 occasion

4 beds were empty on 5 occasions

Use made of the 8 single rooms for intermediate care

7.4. Table 10 shows the different categories of patients who were accommodated in the 8 single rooms for intermediate care, and the numbers of such patients during each month from March to October 1967. Table 11 shows the occupancy of these rooms over the period.

Table 10 - Use made of the 8 intermediate care single rooms

Classification of patients	Mar. 67	Apr. 67	May 67	Jun. 67	Jul. 67	Aug. 67	Sep. 67	Oct. 67
Liable to infect others	104	122	131	138	163	99	135	42
Susceptible to infection	1	1	1	-	-	11	-	1
Observation	97	82	40	35	23	39	54	145
Terminal care	-	-	1	-	14	40	4	18
Likely to disturb other patients	4	14	23	20	5	-	2	8
No other bed available (In intensive nursing care area	-	-	-	-	-	-	1	-
(In four-bed rooms	-	-	7	2	2	7	4	14
Staff	8	-	-	5	9	8	4	3
Social amenity *	7	7	25	32	15	5	5	-
Unoccupied	27	14	20	8	17	39	31	17
Totals	248	240	248	240	248	248	240	248

* Not pay-beds

Table 11 - Occupancy of the 8 intermediate care single rooms

Month	Room/days available	Room/days occupied	Percentage occupancy
Mar. 67	248	221	89%
Apr. 67	240	226	94%
May 67	248	228	92%
Jun. 67	240	232	97%
Jul. 67	248	231	93%
Aug. 67	248	209	84%
Sep. 67	240	209	87%
Oct. 67	248	231	93%

Percentage of bedfast, semi-ambulant and ambulant patients

7.5. The percentages of bedfast, semi-ambulant and ambulant patients during each month from May to October 1967 are shown in Table 12.

During the period there were 9,376 patient days and the percentages for the total patient days were:-

bedfast	36%
semi-ambulant	16%
ambulant	48%

Table 12 - Percentages of bedfast, semi-ambulant and ambulant patients

Month	bedfast	semi-ambulant	ambulant
May 67	43%	11%	46%
Jun. 67	33%	13%	54%
Jul. 67	39%	14%	47%
Aug. 67	37%	19%	44%
Sep. 67	34%	20%	46%
Oct. 67	30%	20%	50%

Use of showers and bathrooms

7.6. The number of occasions during each month from February to October 1967 on which showers and bathrooms were used in Units A and C are shown in Table 13.

Table 13 - Number of occasions on which showers and bathrooms were used

Month	Unit A				Unit C			
	Shower		Bathroom		Shower		Bathroom	
	M.	F.	M.	F.	M.	F.	M.	F.
Feb. 67	34	27	25	17	20	25	34	51
Mar. 67	51	29	30	14	74	20	5	4
Apr. 67	77	62	17	27	107	100	30	32
May 67	127	62	26	12	66	101	47	12
Jun. 67	104	81	10	17	128	128	28	57
Jul. 67	40	63	12	5	68	63	31	29
Aug. 67	57	44	37	41	147	97	9	6
Sep. 67	114	70	33	39	154	149	21	1
Oct. 67	86	52	28	12	200	220	45	24

Use of bed pans

7.7. A monthly summary of the numbers of disposable bed pans used in Units A, B and C is shown in Table 14.

Table 14 - Use of bed pans

Month	Unit A	Unit B	Unit C	Total
Feb. 67	340	178	261	779
Mar. 67	220	143	151	514
Apr. 67	189	67	197	453
May 67	281	96	277	654
Jun. 67	277	71	268	616
Jul. 67	308	114	168	590
Aug. 67	336	77	267	680
Sep. 67	337	194	317	848
Oct. 67	172	100	376	648

Use of day-rooms and sitting-space in rooms

7.8. A record was kept of the number of patients sitting in the day-rooms or in the sitting-spaces in the bedrooms in Units A and C at 10.30 a.m., 3.30 p.m. and 7.30 p.m. each day (the dayrooms were checked at 8.00 p.m.). The totals for each week were aggregated and Table 15 shows these for each week during the month of June 1967. The last two rows in the Table show the average weekly totals during the period February to October 1967 and the range limits during that time.

Table 15 - Weekly totals of patients using day-rooms and sitting space for each week in June 1967

Week Ending	Unit A						Unit C					
	Day-Rooms			Sitting-Space			Day-Rooms			Sitting-Space		
	10.30 a.m.	3.30 p.m.	8.0 p.m.	10.30 a.m.	3.30 p.m.	7.30 p.m.	10.30 a.m.	3.30 p.m.	8.0 p.m.	10.30 a.m.	3.30 p.m.	7.30 p.m.
3 Jun. 67	18	27	31	64	37	23	12	20	32	39	32	37
10 Jun. 67	27	25	20	78	29	30	24	17	38	58	34	30
17 Jun. 67	15	15	29	58	35	29	14	25	45	58	36	33
24 Jun. 67	9	12	18	50	44	20	26	22	44	49	43	26
Average Feb./Oct. 67	16	20	26	46	30	20	12	17	25	47	33	29
Range limits	4-34	6-40	2-58	16-88	9-76	4-55	Nil-34	Nil-41	1-48	18-93	13-63	8-59

Use of treatment rooms

7.9. The use made of the treatment rooms in Units A and C is shown in Table 16 which sets out for the months of March to October 1967 the number of occasions that the rooms were used for various procedures.

Table 16 - Use of treatment rooms

	Unit A								Unit B							
Month	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.
Renewal of dressing	121	177	104	69	40	99	116	89	105	113	112	141	96	68	115	83
Removal of sutures/clips	56	61	50	52	53	50	52	53	48	38	39	53	45	48	42	54
Pre-operative preparation					1			3		13	15	12	13	20	15	10
Enema, colonic lavage, colostomy lavage							1			4	3	3	2	2		
Chest aspiration			1													
Sterno-marrow puncture															1	
Test-meal						1				3		1	2		1	
Examination													1			
Night admission				2		1					1			1		
Instruction to patient									1							
Abdominal paracentesis												1				
Gastric lavage											1					
Last offices										1						

Use of interview/overnight stay room

7.10. The interview room is available to the relatives of seriously ill patients who occasionally stay overnight. Table 17 shows the use made of the room by the nursing staff between March and October 1967. It is a convenient place where medical staff can see relatives, if privacy is needed and no other office is available; but the number of times the medical staff have used the room has not been recorded and is not included in the figures in Table 17.

Table 17 - Use of interview room

Month	Times Used	Number of overnight stays
Mar. 67	5	-
Apr. 67	9	1
May 67	9	3
Jun. 67	18	1
Jul. 67	17	2
Aug. 67	9	-
Sep. 67	1	-
Oct. 67	16	-

Use of oxygen and suction points

7.11. The number of patients who required the use of oxygen or suction points in the ward during each month from February to October 1967 is shown in Table 18.

Table 18 - Number of patients requiring oxygen or suction

Month	Oxygen		Suction	
	Total	I.C.U.	Total	I.C.U.
Feb. 67	3	-	2	-
Mar. 67	11	9	2	2
Apr. 67	11	5	2	1
May 67	6	6	-	-
Jun. 67	12	9	12	8
Jul. 67	18	7	-	-
Aug. 67	5	3	2	1
Sep. 67	6	6	2	2
Oct. 67	13	10	1	1

ESTIMATED NURSE STAFFING

3 Shift System

(made before the ward came into use)

(a) *Ward Unit* - 60 beds.

A and B - 2 Intermediate Care Units of 24 beds) 60 beds
C - 1 Intensive Care Unit of 12 beds)

3 Shifts	1st	2nd	3rd		
Units A and B	6	6	5	=	17
" C	4	4	3	=	11
	10	10	8	=	28

Basic Staff: = (1 Departmental Sister
(2 Ward Sisters
(28 Nurses

Extra Staff necessary for:

(i) 7 days per week
(ii) Holidays and study blocks
(iii) Sickness
(iv) Extra Nursing demands

TOTAL STAFF = Basic x 1.8 = 28 x 1.8 = 50

(b) *Staffing Grades:*

Basic Staff:	Units A and B	Intensive Care Unit
Shift 1 -	2 Staff Nurses	2 Staff Nurses
	2 Student or Pupil Nurses	2 Student Nurses
	2 Auxiliary Nurses	
Shift 2 -	2 Staff Nurses	1 Staff Nurse
	2 Student or Pupil Nurses	3 Student Nurses
	2 Auxiliary Nurses	
Shift 3 -	1 Staff Nurse	1 Staff Nurse
	2 Student or Pupil Nurses	2 Student Nurses
	2 Auxiliary Nurses	

(c) *Total Basic Staff:*

9 Staff Nurses
13 Student or Pupil Nurses
6 Auxiliary Nurses

(d) *Total Extra Staff:*

3 Staff Nurses
10 Student or Pupil Nurses
9 Auxiliary Nurses

(e) *TOTAL STAFF:*

12 Staff Nurses	1 Departmental Sister
23 Student or Pupil Nurses	2 Ward Sisters
15 Auxiliary Nurses	
50	3

VIII - NOTE ON THE 24-HOUR SURVEY

8.1. A 24-hour survey was undertaken in June 1967 to observe in detail how the accommodation was meeting the functional requirements. This survey was carried out by a group including six nurses, four doctors, four architects, five administrative officers and representatives of work study and design interests: there were in all 23 observers.

8.2. The number of patients ranged from 53 to 58 during the 24 hours, giving a bed occupancy of 88.3 to 96.6 per cent. Of the 53 patients there were 24 men and 29 women. There were two admissions from outside the hospital and three patients were transferred from other wards; one patient was discharged. There were no deaths. The eight single rooms outwith the intensive care area were all in use during the survey: seven were occupied by women patients.

8.3. Details were recorded of all nurses' journeys. As anticipated at the planning stage the compact grouping of rooms and the value of direct access to the nurse-working rooms in the intensive care area were apparent. Members of the survey group made their own observations. These may be summarised under the following headings:-

(a) *General impressions*

It was the unanimous view that the basic principles on which the ward unit had been planned were well founded. The effectiveness of linking the intensive nursing care unit on the same floor as the intermediate care areas was recognised. It was noticeable that while the ward unit was well occupied, and although a substantial number of visitors attended during the afternoon, the ward floor remained calm and quiet. The internal glazing pattern gave a successful impression of "openness" and space and provided good nurse/patient observation.

(b) *Planning*

There were numerous appreciative comments. These related mainly to the quiet atmosphere although the ward was busy; the flexible usage; the effectiveness of the viewing panels; the acceptability of patients' shower and toilet facilities, of their wardrobe-cupboards and the effectiveness of the night-lighting.

Criticism referred mainly to points of detail, e.g.:-

Day space - Some expansion to the size of one of the day spaces in each unit was suggested.

Sisters' offices - These were considered to be too small but their grouping with the Nurses' stations and junior doctors' offices was successful.

Ward pantries - With a central arrangement for dishwashing and a waitress service of meals, the size of pantry could be reduced.

Curtains and blinds - The need for inter-room glazing in the intensive care area was questioned.

Wash-hand basins - Where a sink unit was provided, the need for a wash-hand basin in the same room was questioned.

(c) *Engineering*

Heating - The need for easily controlled environmental conditions was stressed by all observers.

Lifts - The size of lift was questioned in relation to its use and the need for reliability stressed.

Patients' handsets - The need for accessibility of handsets to patients in bed was emphasised.

PART III

IX REACTIONS OF USERS

1. Clinical Impressions

Mr. R.G. Main, F.R.C.S - Consultant Surgeon

9.1.1. By many standards, Falkirk Royal Infirmary, which was built in 1932, is a modern district hospital. The former adult surgical unit of 65 beds (which the new unit replaced) consisted of one male ward and one female ward. We received cases from a population of approximately 160,000 throughout 24 hours for 7 days a week, and since there was no other hospital available for overflow we had to take all cases. The convalescent home, more than 20 miles away, was too distant to be of any value to us. Our waiting list was large and was increasing: the number was 860 on the opening of the new unit. In order to deal with the situation it was at times necessary to have as many as 10 extra beds in the middle of each ward. This meant that wards were noisy and lacking in privacy; and it was difficult to encourage recovering patients to get up and walk about, with the result that there was a high use of bed pans. Patients who needed concentrated care were nursed in side rooms and at the duty room end of the ward. The nursing charge was becoming too onerous and caused emotional breakdowns among the staff. The unit was thus put in charge of two sisters. Moreover, the sepsis rate in the unit was high and was continuing to rise. A ward round could be likened to a stroll through Glasgow Central Station on Fair Saturday!

9.1.2. When the new unit became available we asked ourselves a number of questions, and the answers to these will demonstrate how successfully it has met the clinical needs we had at the front of our minds. First, we wanted to know whether the use of the 80 beds* in the new unit would help us to reduce our long waiting list to reasonable numbers in reasonable time, with the same surgical team of two Consultants and one S.H.M.O. Table 1 shows what happened.

Table 1

Number of patients admitted in 10 months (New unit)	1,681
Number on waiting list at 1.1.67	846
Number on waiting list at 31.10.67	464

It should be noted that during this period 100 short stay patients who would previously have been treated in the old surgical unit were not admitted to the new unit but were treated elsewhere.

9.1.3. We also wanted to know what would be the effect of the new unit on the length of time patients had to wait before they were admitted for treatment. On 1st January, 1967 the waiting times were two years for male patients and 1½ years for female patients; but by 31st October, 1967 these times were 10 months for males and 4 months for females.

9.1.4. Flexibility in the admission of the two sexes was another factor we wanted to investigate, and Table 2 shows the male/female ratios on the waiting list and the proportions called from the list at the beginning of 1967 and at the end of September. It demonstrates that flexibility here was complete, in marked contrast to the old Nightingale ward.

Table 2

At 1.1.67	Male/Female Ratio on W.L.	1.7 to 1
	Proportions called from W.L.	2 to 1
At 30.9.67	Male/Female Ratio on W.L.	2.2 to 1
	Proportions called from W.L.	3 to 1

9.1.5. We wanted to know whether we could maintain a high occupancy rate with comfort to both patients and staff. Although the occupancy rate in the old surgical unit was high, the convenience of patients and staff suffered, and there were constant complaints from nursing staff. The comparative occupancy rates are given in Table 3.

Table 3

	Year	Occupancy
Old wards	1965	88%
	1966	88%
New unit	1967	83%

* i.e., 60 in the project and 20 in the ward floor above.

The high rate of occupancy has been well maintained, but without any of the strains that made life so difficult in the old wards. It has never yet been necessary to bring in any extra beds into the unit, although there is still no other hospital nearby to act as "safety-valve" in emergencies, and though the convalescent home is still at the same distance as before.

9.1.6. In the old wards we considered that the duration of patient-stay was as short as was compatible with the comfort and safety of patients, and we wanted to find out what effect the new unit would have on duration of stay. The comparative figures are shown in Table 4.

Table 4

Old Wards	1965	11 days
	1966	10.8 days
New Unit	1967	9.8 days

It should be remembered that 100 short stay cases which would formerly have been treated in the old surgical unit were not admitted to the new unit and that if they had been this would have reduced the average duration of stay still further. We believe that the figures for rate of occupancy and duration of stay could be further improved if short-stay pre-discharge accommodation were provided in the hospital grounds for patients well enough to leave the ward but still needing to remain in the precincts of the hospital. The accommodation could be in charge of a state registered nurse (one would be needed by day, and one by night) and staffed by enrolled or auxiliary nurses.

9.1.7. We wondered whether the concentrated nursing care area provided in the new unit would be adequate. With 4, 8 or 12 intensive care beds available according to demand, we found that patients in these beds represented from 12 per cent to 15 per cent of the patients in the 80 beds each month, and that the average number of intensive care beds in use was 10.8. We consider that this is an adequate proportion of concentrated care beds to provide for this unit. The types of patient admitted to the unit are: major post-operative cases (2-3 days); ill patients on admission; patients with major complications; and cases for monitoring.

9.1.8. In the old wards there had been a high and rising sepsis rate and we were interested to find whether the new unit would bring about any improvement. In our investigation we excluded the following cases:-

appendicectomies,
out-patients,
patients not having operation,
old ward patients,
sepsis *ab initio*,
children's ward cases.

The results of our monitoring of staphylococcal wound sepsis expressed as an average percentage for all surgeons from 1964 to 1967 is given in Table 5.

Table 5

	1964	1965	1966	1967 (new unit)
Average for all surgeons	3.8%	5.4%	7.2%	6.5%

These figures however conceal a situation resulting from the sensitivity of one of our surgeons to a certain type of rubber glove, which we are now correcting. The figures in Table 6 demonstrate the percentages of staphylococcal wound sepsis in patients operated on by the different surgeons.

Table 6

Surgeon	1964	1965	1966	1967 (new unit)
A	2.3%	4.8%	6.4%	1.5%
B	2.7%	2.6%	5.3%	3.0%
C	6.3%	8.9%	9.8%	15.1%

The staphylococcal nasal carrier rates for the three surgeons in the new unit from 1st January to 31st October 1967 are given in Table 7.

Table 7

Surgeon A	6% + ve
Surgeon B	64% + ve
Surgeon C	83% + ve

Our conclusions on sepsis are that the rising rate in the old wards was due to increasing pressure of work and to overcrowding; that there has been a reduction in the sepsis rate in the new unit for two surgeons; that the degree of cross-infection is minimal; and that the present sepsis rate taken as

a whole in the new unit is mainly due to the personal problem experienced by one of the three surgeons.*

9.1.9. Early ambulation has been a practical possibility in the new unit, although this was not the case in the old wards. Patients are encouraged to get up by the fact that they have sitting accommodation in their bedrooms which are provided with suitable chairs. The toilets and showers opening from the bedrooms are an added encouragement to early ambulation, and patients are spared as far as possible the strain of having to use bed-pans. It helps morale to have your clothes beside you and this is possible because of the wardrobes provided in the bedrooms of the new unit. Furthermore, patients have day spaces outside the bedrooms where books, television and radio are provided, and this also encourages early ambulation.

9.1.10. We are satisfied that patients have privacy and quiet, although at the same time the design of the ward permits the staff to supervise and observe their charge adequately. Moreover the design of the ward makes progressive patient care worthwhile and ensures that the staff are freed from unnecessary pressure and friction so that they can concentrate on their patients. The nursing staff appear to be happy with the accommodation and with the system of working which the design of the ward permits.

9.1.11. No unit is entirely without defect and we have a number of criticisms. The mobility of the beds leaves something to be desired, particularly in a unit in which there is so much movement of beds. We feel the lack of secretarial accommodation and of a medical staff room which could also be used as a seminar room. Moreover, the nurses' duty room is too small. We think that nitrous oxide outlets could have been provided in the treatment rooms for use when patients have to undergo painful procedures; and we find that the light within the drawn curtains around beds is insufficient. Another criticism concerns the lack of variety in the décor throughout the unit which makes it difficult to distinguish different bedrooms. Finally we wonder whether the design makes sufficient provision for the evacuation of patients in the event of fire.

9.1.12. Our major complaint in respect of workmanship concerns the lifts which have been very unsatisfactory. It has been necessary to keep oxygen in each lift in case the machinery breaks down while a patient is being carried, an event which has all too frequently occurred. We have also found that the control of temperature in the unit has been insufficiently sensitive; and we have criticisms about window leaks.

9.1.13. In conclusion, however, our overall impression of the new unit is that it is quiet, modern, efficient, smooth-running and aesthetically satisfying to those who use it.

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* It is of interest to note that subsequent statistics have justified the expectation of a drop in the infection rate. For the months of November and December, 1967 and January and February, 1968, the average rate was under 1 per cent.

2. Impressions of the Nursing Staff

Miss H.C. Griffin, S.R.N., Administrative Sister

9.2.1. As with all new ventures, the immediate reaction of the staff was not entirely one of approval. Confronted by this beautiful building (in which at first everything seemed to go wrong) the old familiar things suddenly became very much more acceptable. Not one of us had worked in anything resembling this type of lay-out before, and there was a great deal of re-education to be done. It was not too long however before the nurses began to look as if they enjoyed working in their new surroundings, and within a few months we had worked out a pattern for running the three areas included in the ward floor, and this method has proved very satisfactory in a surgical ward.

Nurse staffing

9.2.2. The statistics prove that we have not been extravagant with nursing staff. The two intermediate care areas (24-28 beds) can be staffed from 8 a.m. to 9 p.m. as follows:

7 nurses (minimum number)
1 sister
1 staff nurse (or 2 E/N)
1 enrolled nurse + 4 nurses in various grades (students, pupils or auxiliary)

The intensive nursing care area (4, 8 or 12 beds) can be staffed thus:

5 (minimum number) (preferably 6)
1 sister
2 staff nurses
2 - 3 others - senior students to gain experience.

If this area is not busy, the staff help elsewhere. For night duty approximately 5 or 6 nurses are needed every night.

9.2.3. We were unable to introduce internal rotation of nurses to include night duty due to the fact that the hospital employs many part-time staff nurses who request permanent night work, but we are still hoping it may be possible to do this. During the day, the departmental sister, and at night, the night superintendent, can move nurses within the unit depending on the work load in the different areas. There is always one sister on duty in the evening who will supervise the unit when the administrative sister is away, and we hope this has helped the general administration in the hospital.

9.2.4. The sisters working in this type of unit feel that they have not the independence that was, and still is, enjoyed by the sister of a Nightingale ward. They not only have to see that their own particular area is staffed correctly, but have to work out the off-duty with each other, which naturally brings problems. The sisters in the intermediate areas have to "lose" their patients temporarily to the intensive nursing care unit, but they all now agree that this is best for the patient (which is the reason for doing it) and so accept it. It is essential that new nurse training schemes prepare the sisters of the future for this somewhat different role, and that more care is given to the selection of those who have to work so closely together.

9.2.5. This level of nurse staffing can only be sufficient and effective if it can rely on good supporting services, preferably for seven days a week, especially with the increase in the number of part-time nursing staff who only work from Monday to Friday. The supporting services would include:

(a) a ward clerkess/receptionist who does most of the clerical work, gets case notes and X-rays, orders ambulances, makes appointments, greets admissions, takes particulars, directs visitors and attends to mail;

(b) an efficient topping-up service for linen, soap, stores, C.S.S.D., I.V. fluids, disposable equipment, and possibly drugs, to cut out ordering stores, prevent hoarding and generally save nursing time;

(c) a waitress service for all meals and hot drinks;

(d) a part-time orderly to do the flowers, which when done properly, take up to 1½ hours per day;

(e) adequate help from the porters;

(f) a male orderly to shave patients (both socially and in preparation for theatre);

(g) good domestic and orderly service.

We have been very fortunate in having this support; and have been especially grateful to our domestic workers who work as follows:

3 part-time domestics (1 relief) - 7.30 a.m. to 1.30 p.m.

1 orderly - 7.30 a.m. to 3 p.m.

1 part-time orderly - 7.30 a.m. to 12.30 p.m.

The work has been carefully planned among the domestic staff, and the equipment and domestic service room provided are very good.

9.2.6. With the new lay-out, and with the introduction of good supporting services, we were able to work out new routines and procedures which we hope have been of benefit to the patients and their relatives, by, for example, allowing convalescent patients and those requiring no treatment to sleep later in the mornings and permitting less restricted visiting; both of which improvements were made possible by the sub-division of the wards. The reaction of the relatives to this has been very favourable. The nurses find that there is more time to listen to and talk to the patients, and there is more time to teach the student and pupil nurses. This is done by the ward sister, the clinical instructor, and the departmental sister, with the result that better supervision of the students is ensured.

Flexibility

9.2.7. The self-contained units of 4 beds each with its own toilet and shower accommodation have made it possible to have male and female patients in the same ward area. The mixing of the sexes had caused no problem, and generally speaking the patients like it. There have been very few comments about the absence of segregation.

9.2.8. The six four-bedded rooms and the four single rooms are a good combination, and allow for great flexibility. The fact that we have this flexibility does cause extra work, in that there is often a great deal of bed and locker shifting to be done. Porters are not always readily available and the nurses have to do this themselves. The bed was especially designed to allow for this frequent moving, but several problems were encountered when the performance of the bed did not come up to expectations. The idea of having an easily moveable bed for transporting people to theatre and to other parts of the unit is excellent, but the bed must be reliable and easily maintained.

Intensive nursing care unit

9.2.9. The presence of the intensive nursing care area within the 60 beds has been invaluable. It must be emphasised that it is for intensive nursing care and not intensive therapy. It is used for:

(a) patients returning from theatre after major operations;

(b) those requiring constant observation or monitoring facilities;

(c) very ill patients.

Two, or at most three, nurses can look after the 8 to 12 patients in this area, leaving the less trained staff to take charge of the intermediate areas if necessary. The usual length of stay in the intensive nursing care area is 2 to 3 days. We have noticed that on the occasions we have had to nurse the more ill patients in the intermediate areas it has not been so satisfactory because the observation of patients is more difficult. Being moved to this area does not worry the patients, provided the reasons are fully explained beforehand. At the beginning, this area had a variety of names, including "The Extensive Care Unit", "The Expensive Care Unit", "The Tension Care Unit", and what amused us most in those early days, "The Carefree Unit".

Nurse working rooms

9.2.10. The central core of working rooms has been very successful, and no adverse comments have been made about working in artificial light. There are four rooms, two clean and two for disposal.

Preparation room

9.2.11. The idea of having one place only in which to find all necessary equipment for treatments is ideal. There is no time wasted collecting things from various rooms as this room provides space for linen, drugs (including dangerous drugs cupboard), C.S.S.D. packs, intravenous fluids, and all other routine stock. The storage space is adequate, provided a good topping up service is maintained. The only equipment not kept in this room is the bulky type such as drip stands, cot sides and bed cradles, and two generous-sized rooms have been provided in which to store these. In the preparation room the absence of working surfaces other than trolley tops has caused no inconvenience, and with the compact C.S.S.D. packs we feel that smaller trolleys would suffice. The other clean area is the kitchen, and this is used very seldom. The water carafes and tumblersare washed here, occasional hot drinks are made, and it is sometimes necessary to keep a meal in the oven if a patient is away at X-ray. The provision of a fair-sized refrigerator, a cooker, and a Stott hot water boiler has probably been extravagant.

Disposal areas

9.2.12. The disposal area is large enough, though if dirty linen and rubbish are not collected frequently it can become overcrowded on busy days. The cupboard space is overgenerous and encourages people to order more than they need so that they can fill up the empty shelves. The sluice room with the Clinimatic bed pan disposer is large enough, and the cupboard space good. This includes a urine-testing cupboard and a ventilated one for the storage of specimens. The absence of doors leading to these areas is an advantage. No undue noise is apparent from Clinimatic or other equipment used at night.

Treatment room

9.2.13. The treatment room has proved popular with the patients, and it is obvious from their comments that they much prefer to have dressings and other treatments done in the privacy of this room. They feel free to give vent to their feelings without the fear of disturbing their fellow patients. The one adverse comment is that the examination couch is not adjustable and is too high for most people. The nurses like the space and good light provided, and find no hardship in not having equipment in this room, or in its being separated from the preparation and disposal areas. It has been useful for admitting patients at night (or during visiting hours) and it is the practice of the receiving unit to leave a bed in this room before going off duty if there are no single rooms empty.

Patient areas

9.2.14. 28 beds seems an ideal nursing charge provided the very ill patients are in a separate area, but the addition of a few more beds would still be acceptable. The general opinion of the patients is that four beds is a good number for the multi-bed rooms, and the majority do not like the single rooms, apart from during the immediate post-operative days.

9.2.15. The inclusion of the W.C. and shower within the bed area is very satisfactory, and early ambulation has been helped by the close proximity of these rooms. The showers have proved very popular with all age groups, but we have had some inconsistency in the thermostatic control of the water. The W.C. facilities have been very greatly appreciated as they have cut down the need to use that most dreaded hospital article, the bed-pan. The frequent use of the showers has meant that one bathroom is adequate.

9.2.16. The generous space allowed in the bed areas for sitting and the comfortable chairs provided are highly commended, and many people prefer to sit here for meals.

9.2.17. The wardrobes within the bed areas have proved valuable, although the position of some of them is inconvenient. It has been interesting to note that patients are not very keen on getting dressed when convalescent, but this is still a relatively new idea. Nurses often forget to move the clothes at the same time as the patient is being moved which leads to confusion, but this again is a question of re-education.

9.2.18. The curtains around the bed have presented several difficulties:

(a) the medical staff complain of lack of light for examinations, but this is probably due to the type of bed light provided, and an anglepose light-fitting on the locker would have been better;

(b) the nylon runners frequently stick in the curtain track and the "rufflette" tape gets torn easily;

(c) it is essential to have someone to change the curtains regularly, and the height is such that they can only be changed from the top of a step ladder - a procedure which is difficult for female domestic staff, though a male orderly can do this.

Single rooms

9.2.19. These have been used mainly for patients requiring isolation, for example, those infected on admission; and they are also used to prevent infection, for terminal cases, and for noisy and confused patients. Occasionally they are available for those who particularly request privacy, but medical reasons get priority. The curtains in these rooms are placed wrongly on the outside of the door, and this detracts from the privacy. Wardrobes in corner rooms were dangerously placed, but they have now been changed. The position of the handle on the sliding doors prevents the doors from being opened to their full width and does not permit beds to be moved easily, especially if cot sides are in use.

Day rooms

9.2.20. These are well used, and for most of the day are large enough for those using them. They are rather small when the evening comes and television starts, and popular programmes result in overcrowding. It is difficult to control the temperature in these rooms due to the large glazed areas and the absence of venetian blinds, so they are very hot in summer and very cold in winter. The sound-proofing is not adequate, and the noise of the television and radio can be heard distinctly in the adjoining single room and corridor. The day room is useful for teaching sessions between 2-3 p.m., when most patients are resting.

Duty rooms

9.2.21. These are well placed and the space is adequate for writing and recording, but there is no privacy at all. The sisters do not feel free to talk on the telephone or to reprimand nurses in case they are overheard. We would have liked a communal room for the sisters as well as this office. The house officer's room is adequate (though sister's room always seems to be more popular). Case notes, X-rays and nursing reports are available to both rooms which is satisfactory.

Interview room

9.2.22. This has been very useful for relatives waiting to see the doctor, waiting for emergency operation cases to return from theatre or calling to collect the death certificates and the clothes of their deceased relatives. I would like to mention here the need for a cupboard in which to store these clothes and other articles which we often have to keep for a few days. The room has not been used very often for overnight stay, but it is one which we would not like to be without.

General Features

9.2.23. The observation throughout the intermediate areas is adequate for the type of patients we are nursing. The patients do not feel overlooked and like to see the nurses passing by which makes them feel they are not neglected. Observation in the intensive nursing care area is very good, though the type of curtains used initially detracted from this. We are experimenting with venetian blinds which are better.* Although we do not require to have constant observation between the four single rooms, it has been necessary to have this on occasions, and therefore provision for it is good. The fact that this area has its own four working rooms is excellent, as observation is still possible from these.

Heating

9.2.24. We accepted that the heating and ventilation systems were part of the experiment, but they did cause distress at times. The main complaint was that the wards were stuffy and airless, and usually too hot; though reactions varied according to individuals. The majority of people wanted the windows open and this in itself posed another problem. The heavy double-glazed windows have to be opened with a key and locked into position, which is time-consuming. The porter does this in the day, and the auxiliary nurse in the evening. Very often, having had all the windows opened, the patients wanted them shut again. The weather outside seems to determine the temperature inside, though we have been assured that this is not so. Some wards felt cold and others hot, although the thermograph did not agree with us on this point. There was considerable noise from the ventilating fans at night, but this has now been rectified. It is difficult to assess the success of these services as nearly everyone wants something different, and the engineers work very hard and patiently to keep up with our wishes.

Call system

9.2.25. The principle is good. The buzzer can be heard from all parts of the unit, and the illuminated panels direct the nurses to the appropriate area. We have difficulty however in finding a suitable place for fixing the handset by patients' beds and this leads to many being broken, leaving the patient without means of calling the nurse,

* Venetian blinds have now been fitted.

switching on his bedlight, or listening to the wireless. The locker seems to be the best place for the handset.

Catering and waitress service

9.2.26. This is a wonderful innovation, and one which I would warmly recommend. Patients choose meals from a menu card, the kitchen staff set the trays and plate the meals, and the waitresses serve them at ward level, supervised by the nursing staff. They are quick and efficient, and the food is usually hot. All meals and morning and evening drinks are served in this way, and the dishes are washed centrally. The only difficulties that arise are when the waitresses return too quickly to collect the trays and the patients have not finished eating, and when, as a result of a general move round, the waitresses cannot find the right patient.

Conclusion

9.2.27. I would endorse Mr. Main's summing up. It is possible to run this unit easily. It is quiet, spacious and gracious and has a relaxed and happy atmosphere for patients, their relatives and the staff. It may now be true to say that ward rounds are more like a stroll through Princes Street Gardens rather than through Glasgow Central Station. We started this venture with a well-planned building, a pleasant environment and first class equipment, but were not sure whether we would prove the planning assumptions to be correct. We experienced many faults due to poor workmanship and made many mistakes in our original organisation; but with good communication and co-operation between all grades of staff, we feel that these have been overcome, and the end result is a successful one.

X STANDARDS AND COSTS

10.1. The purpose of this section is limited to looking at the key functional features of the ward unit to assess their cost against the benefits these features provide. These cost estimates are not expressed in total cost terms, with capital and running costs brought to present value; the figures are limited to capital cost only.

10.2. This aspect of the evaluation exercise has not been developed in depth, and the information presented is incomplete and approximate; but some broad costings should help to focus attention on questions which are of importance in planning new hospital wards.

10.3. A key principle in all recent Scottish hospital planning has been that the Department have tried to plan up to a standard and down to a cost. It is only since the expansion of the hospital building programme that began about 1960 that the scale of operations has justified the efforts needed to establish planning standards and cost limits; indeed it was only since then that there have been in the United Kingdom a reasonable number of new hospital buildings from which to draw lessons about functional, building and engineering standards, as well as about construction costs.

Cost limits

10.4. The Falkirk Ward Unit is a development project, built to exemplify certain standards; and a theoretical approach might have been to design a ward to ideal standards, then to build it, and so to find out what it cost. This is not, of course, what happened. As the planning work for the ward proceeded, costs were very closely scrutinised, and intentions were modified at various stages to reduce costs. The unit was basically a medical and nursing experiment, and not an architectural or an engineering development project; and there was strong pressure to keep down costs.

10.5. Initially, in their planning and cost control operations, the team were working simply under the discipline of trying to keep costs as low as possible, compatible with the achievement of the main functional standards which the ward was to illustrate. In this they had a powerful spur in the form of the cost targets produced by the Ministry of Health. The Department is indebted to the Ministry for the immense amount of work and original thought that they put into the concept of departmental cost allowances and cost limits; and it was highly gratifying to the Falkirk team when, just as they were about to proceed to the working drawing stage, the results of the Ministry's work on deep-plan wards emerged, and it became clear that the probable costs for the Falkirk Ward were closely in line with the Ministry's cost target figures for such wards.

10.6. The Appendix to this section shows a later cost comparison based on tender prices, and an analysis based on final costs. These calculations reflect the ward costs for the purposes of cost limit comparisons. At the time the contract was let, the Falkirk Ward conformed to a cost limit based on the Building Note for deep plan wards, but since then, building costs have risen while cost limits have not; and the Department would now recognise that it would be extremely difficult, if not impossible, to plan and build a 120 bed ward block to the Falkirk plan within current cost limits, without cutting building standards below acceptable limits. This is not simply an academic question. The cost limits remain the basic cost controls, and in the further application of the Falkirk principles, which are already being applied elsewhere on a large scale, planning teams must keep within cost limits.

Area comparisons

10.7. It is helpful before turning to the cost of particular features of the ward to look at one or two other general comparisons. One yardstick often used in ward comparisons is that of the area per bed. In this connection it is sometimes difficult to be sure that like is compared with like, but Table 1 shows the net areas per bed of a number of different wards, excluding lifts, stairs, and communication space.

Table 1 - Approximate net areas per bed of various ward units

Ward	Number of beds	Sq. ft. per bed
Nightingale	24	200
E.M.S.	28 to 32	174
Vale of Leven	2 x 25	183
Larkfield	32	246
Welwyn	2 x 29	228
Eastburn	30	262
Greenwich	72	248
Bristol	60	293
Falkirk	60	302
Gartnavel	72	307
Greenock	72	324
S.H.H.D. 6-bed	72	254
Aberdeen Royal Infirmary	58	394

The wards listed above represent a wide range of accommodation from an almost complete absence of privacy for patients combined with sub-standard ancillary and sanitary facilities, to more acceptable and forward-looking standards. They typify planning opinion over more than a century of hospital design.

10.8. The precise figures in Table 1 are not important; but it can be seen that the Falkirk Ward

is near the top of the range. At present the nearest plan to be worked out on Falkirk principles, at lower areas per bed, is a linear version of Falkirk by Messrs. Keppie, Henderson and Partners, who were also the project architects for the Falkirk Ward. This Gartnavel plan provides 72 beds per floor, and has the equivalent of two or three additional consultants' rooms over the Falkirk plan. Allowing for this, it works out at almost the same area, 307 sq. ft. per bed. It seems therefore that going up to 72 beds per floor does not reduce the area materially; and this is not related to a linear design; there is a deep 72-bed plan for Greenock, which brings out an even higher area per bed. It is interesting that at an earlier stage in the planning of the Falkirk Ward, when the number of beds was increased from 48 to 60, the increase did result in a lower area per bed. A standard in the middle of the range would be about 250 sq. ft. per bed. This is the kind of figure the Ministry of Health are aiming at in their current standard ward exercise.

10.9. A first and very rough estimate can be made of the cost of the extra space at Falkirk over this rather arbitrary standard of 250 sq. ft. per bed by taking the difference - 52 sq. ft. per bed - and applying a sq. ft. rate to it. £6 3s. 10d. is the overall rate appropriate to ward accommodation. This would give about £320 per bed.

Engineering costs

10.10. The engineering cost obviously ought to include both capital and running costs; this discussion is restricted to capital costs.

10.11. The engineering remit specifically excluded the provision of cooling in this deep planned ward. This meant that the required environmental conditions had to be achieved by heating and artificial ventilation alone, supplemented by the opening of windows when required. The engineering costs of the ward worked out at 50s. per sq. ft. as shown in paragraph 11 of Section V. The ventilation system at 20s. a sq. ft., without cooling, can properly be considered a low-cost system, but even this costs as much as £300 a bed. Against this there are some offsetting savings. With the deep plan, the core areas require no heating at all, which possibly saves about £60 a bed. There is some reduction in the amount of expensive outer wall which is difficult to price. Some running costs are increased with an artificial ventilation system and some are reduced.

10.12. A more sophisticated system including cooling, possibly a twin duct system which would permit much better local control, would probably cost about twice as much as the low cost system installed at Falkirk. The engineering costs of the Falkirk Ward have also been affected by the ward layout, which resulted in an appreciable number of long runs of services.

Deep versus linear plans

10.13. Consideration of engineering costs leads to the question of the respective merits of deep versus linear plans. On the basis of experience gained so far, the Department are prepared to approve deep ward plans in Scotland only on sites where it is impossible to provide linear plans economically.

10.14. The deep plan at Falkirk is only one way of planning a ward to the principles described in the Department's Ward Planning Note. The Department's ward planning team are satisfied that the linear Gartnavel plan meets all the essential requirements set out in the planning assumptions in Section III above, and the engineering context of the ward plan is much reduced compared with Falkirk.

10.15. The following features of the Falkirk Ward seem to be the most important functional features carrying identifiable cost implications. Some attempt is made below to explore the cost implications of these features.

Four-bed rooms

10.16. The choice of four-bed rooms is one cost factor that can be treated fairly rigorously. The Department know from the Falkirk and Gartnavel plans that a ward unit using four-bed rooms in the intermediate care area needs about 302 sq. ft. per bed; this is on the basis of 72 beds per ward floor, including a 12 bed intensive nursing care area on the Falkirk pattern. Their ward planning group have prepared an alternative linear 72-bed unit based on 6-bed rooms in the intermediate care area which has now been fully worked out. This unit, with eight 6-bed rooms instead of twelve 4-bed rooms in the intermediate care area, a re-arrangement of the nurses' working rooms, and some other relatively slight modifications, works out at 254 sq. ft. per bed. By far the greater part of this reduction in area is attributable simply to changing from four beds per room to six.

10.17. When costing four-bed rooms against six-bed rooms in a 72-bed floor, it is possible to put a rough cost on this feature of £300 a bed. This is not a small price, but it is necessary also to consider with care the benefits of choosing four beds as against six beds per room. (See Section III, paragraph 12). In the 1963 International Hospital Federation ward planning discussions, the Department's representative had to defend the choice of four-bed rooms mixed with single bed rooms against a strong body of international opinion that advocated one and two-bed rooms only, and considered Scottish thinking very backward.

Provision of separate washing facilities and W.C.s for each bed room

10.18. The alternative to the provision of separate patients' washing facilities, showers, and W.C.s

opening off each bed room in the intermediate care area is the provision of grouped sanitary facilities. The main difference in cost here arises from the additional circulation space needed. Most of this is in the bed areas themselves, but there will be some consequential increase in the ward corridor as well. There will also be some extra plumbing and engineering costs because of longer runs for pipes and ducts to dispersed points. Comparing the Falkirk Ward with a 30-bed ward based on grouped plumbing for patients, the cost of this feature may be estimated at about £76 per bed, plus a factor for the engineering and plumbing costs of dispersal. Changing to six-bed rooms in the intermediate care area reduces the cost of this feature considerably, to a matter of only about £36 per bed, again excluding the additional engineering and plumbing costs attributable to dispersal.

Rooms versus bays

10.19. The third feature also concerns the multi-bed rooms in the intermediate care area, and is in effect the choice of rooms instead of open bays. At Falkirk the cost of providing partitions and doors to the corridor from these rooms is about £1,400, or £23 a bed. In the Department's linear 72-bed plan with six beds per room, the cost is about £14 a bed. The cost of possible alternatives varies, from the cost of full partitioning, omitting only the doors, to almost nil in those examples where no partitioning at all is provided to the corridor. The saving might be put at £10 a bed. Some further saving, perhaps of about the same order, may be possible if the omission of doors and widening of the door aperture should permit some narrowing of the ward corridor. The overall cost of this feature might thus be about £20 a bed.

Dispersed day space

10.20. The three features mentioned and one other make up the main special characteristics of the Falkirk intermediate care multi-bed rooms. The other is the provision of dispersed day space, that is a certain amount of sitting space in the bedroom, found within the total day area to which cost limits have been related. It does not appear that this feature carries any significant extra cost.

Separate nurses' working rooms for the intensive nursing care area

10.21. A basic feature of current ward plans, beginning with Falkirk, is the provision of a separate cluster of nurses' working rooms to serve the intensive nursing care area. There are three such groups for 60 beds at Falkirk, and three for 72 beds in later plans. This element can be provided within a 72-bed floor at 250 sq. ft. per bed, if six-bed rooms are adopted in the intermediate care area. One way to estimate their cost is to think of the alternative of the nurses' cluster serving 30 beds, as in some plans which do not provide for an intensive nursing care area. (One of the nurses' clusters in the intermediate care area at Falkirk will serve 28 beds, when the interchangeable four-bed unit in the intensive nursing care area is in use as part of the main intermediate care area. In a 72-bed ward in this situation there will be 34 beds served from a single cluster).

10.22. The nurses' cluster with its share of ward circulation costs roughly £5,200. Three for 72 beds thus costs £215 per bed, and one for 30, £172 per bed, a difference of about £43 per bed. This is about one-eighth of the cost of choosing four beds instead of six. It is also about the cost of a week's stay in an acute hospital. This admits the argument that if the care facilitated by the provision of the independent nurse-working rooms for the intensive nursing care area shortens average stay by 2 per cent it is paid for in little over a year. This calculation could obviously be considerably refined and developed.

Summary

10.23. Table 2 summarises the cost estimates of the features that have been isolated.

Table 2 - Rough cost estimates for individual planning features

	£ per bed
Four beds rather than six beds for intermediate care area	300
Separate W.C. facilities for each room in the intermediate care area	36 to 76 (plus)
Rooms rather than bays	20
Separate nursing cluster for the intensive nursing care area	35 to 43

10.24. It must be stressed that these estimates are very rough, and that more detailed work would be needed to establish more reliable and accurate estimates. The Department consider however that they give a reasonably fair picture of the relative costs of four main planning features of the Falkirk Ward, and show where the weight of argument should be directed in relation to costs. Cost economies must however be considered in relation to functional effects.

10.25. It is essential to keep in mind the purpose of spending money on good ward planning. It represents an investment over at least half a century; it must meet unexpected changes and it will be in use day and night all the year round. The great majority of nurses work in the wards; in Falkirk itself, for example, three-quarters of the total nursing staff are allocated to the wards, and the ward is the area where the hospital planner can do most to facilitate the work of the nurse. It is also the area where he can do most to make the patient's stay in hospital comfortable and can help to remove the unnecessary apprehensions and indignities with which our patients are faced in some of the units which are in use today.

COST ANALYSIS

Date of Tender:- July, 1963.

Date of Completion of Works:- November, 1966.

(A) *Cost of Wards (Exclusive of external works):-*

	£
(i) Estimated cost of 60-bed ward floor, based on cost plan	154,200
(ii) Tender cost based on bills of quantities for building works and services	146,058
(iii) Estimated cost of two ward floors (120 beds in all) based on tenders	273,600
(iv) Comparative cost of 120 beds based on Building Note 17, for race-track wards	277,024
(v) Estimated cost of two ward floors (120 beds in all) based on final cost of building	273,782

Notes:-

The amounts shown in (i) to (v) above include a proportion of the structural costs of the building together with the cost of communication spaces, staircases, lifts and a share of mechanical and electrical plant.

Costs were favourably influenced by keen competitive tendering.

The gross area per bed, including circulation but excluding communication space, stairs and lifts, is approximately 12 sq. ft. greater than that represented by Building Note 17. Excluding circulation the net area per bed exceeds that in Building Note 17 by approximately 22 sq. ft. Economical planning involving a lower circulation allowance thus reduced the excess area per bed by 10 sq. ft.

(B) *Comparative Costs of Building:-*

	Based On	
	Tender	Final Cost
	£	£
Main Building	426,892	409,188
Connecting Link with Duct	12,411	13,350
External Works	17,614	19,104
	£456,917	£441,642

(C) *Cost Analysis*

(i) *Floor Areas:-*

	Sq. ft.
Ward (1st floor)	19,090
Ward (2nd floor)	19,090
Pent house	1,763
Theatre	13,745
Basement	5,990
	59,678 sq. ft.

(ii) *Elemental Analysis of Ward Areas*

Element	Total Cost of Element	Rate per sq. ft.	
	£	s.	d.
Preliminaries	16,468	8	7½
Work below lowest floor level	11,578	6	-¾
Frame	4,322	2	3
External walls	15,688	8	2½
External doors and windows	5,349	2	9½
Roof construction	6,418	3	4¼
Roof coverings	4,937	2	7
Upper floor construction	14,715	7	8½
Staircase (excluding finishes)	1,284	-	8¼
Internal partitions	14,600	7	7¾
Internal doors	12,620	6	7½
Wall finishes	15,415	8	1
Floor finishes	9,431	4	11¼
Ceiling finishes	12,508	6	6¾
Decoration	4,490	2	4¼
Fittings and furniture	1,852	-	11¾
Plumbing (external)	355	-	2¼
Sanitary fittings and wastes	13,483	7	-¾
Mechanical engineering	68,095	35	8
Electrical engineering	29,129	15	3
Lifts	7,703	4	-½
Builders work in connection with mechanical and electrical engineering	3,342	1	9
	£273,782	143	5

XI. VIEWS EXPRESSED AT THE SYMPOSIUM, DECEMBER 1967

1. Planning Assumptions

11.1.1. Syndicate discussions were directed to the main planning assumptions, engineering features of the ward unit and administrative aspects.

Use of mock-ups

11.1.2. A mock-up had been constructed of the group of rooms forming the main nurse working areas and of one of the sanitary annexes to test the design before it was settled. These had been of considerable assistance in deciding the most convenient relationship between the rooms and areas involved. For example, they had allowed full advantage to be taken of the proposed absence of doors in the rooms in the central core of the ward, and had permitted the best height for the observation panels to be ascertained. The mock-up of the combined shower and washing compartment had enabled the successful Falkirk layout to be achieved. It was important that mock-ups should be constructed for key rooms. To be effective, mock-ups should be easily dismantled and adjusted; they should allow, for example, the position of doors, windows and ceiling heights to be altered during the study.

Deep plans

11.1.3. While the policy on the use of deep plans was that they should be adopted only where a linear design was shown to be unsuitable, a layout of this kind was chosen for Falkirk as this form was favoured elsewhere in the early 1960s and also as no example was available in Scotland for study. Now however, the main principles of ward design as set out in the Planning Note and as expressed at Falkirk, are being applied in linear form in other hospital projects at an advanced stage of planning in Scotland.

Disposal and preparation rooms

11.1.4. On the question whether the preparation and disposal rooms opening on to each other would entail an increased risk of cross-infection, it was explained that bacteriological tests, while not extensive and to be repeated at Falkirk, had indicated that the disposal room was as "clean" as other rooms in the ward. The title "dirty utility room" was considered to be out-of-date in relation to modern disposal procedures. The term "disposal room" expressed more accurately its main function, i.e., as a collection point for used material suitably bagged. Nurses walked from the disposal to the preparation room in the course of routine work, and from an infection point of view there was no difference between doing this and crossing a corridor. Indeed, where doors were provided in these much used rooms, they might be tied open for convenience. The compact relationship of the main nurse working rooms helped to promote good nursing disciplines, and the "bagging" of used material and equipment at the point of use was helpful in minimising cross-infection. It was noted however that the sluice room should be physically distinct from the disposal room. It was in the sluice room that infected material was handled, e.g., in dealing with specimens of excreta.

11.1.5. Direct vision into the bed areas from the preparation and disposal rooms had proved effective at Falkirk in facilitating supervision and improving staff communication. This had not resulted in patients suffering from glare from these working rooms at night. The sources of light were not visible to patients in bed.

Sanitary annexes

11.1.6. The question of patients feeling ill or collapsing in W.Cs and showers was raised, and it was noted that in over a year no difficulty had arisen from patients being overlooked in this situation. If a patient felt ill while in a sanitary annexe opening off a bed bay, the other patients might draw attention to their absence from the ward area, and observation into the ward from the corridor was good. Furthermore, a suitable nurse-call bell was available in the W.C. area.

Four-bed rooms and six-bed rooms

11.1.7. The four-bed grouping at Falkirk had proved entirely satisfactory. It was suggested that a preference for six-bed rooms arose for financial reasons and not in relation to functional planning. On the other hand, it was stated that whilst it was argued that patients might prefer four-bed rooms, when this question had been put to patients in six-bed wards they had expressed surprise that these were thought to be unsatisfactory. Nevertheless, when a corner bed became vacant, patients asked to be transferred to it and never from it. Others suggested that in a six-bed ward patients could more easily opt out of a conversation and that adequate privacy could be obtained by the use of curtains.

11.1.8. Some factors in favour of the four-bed room could be measured. It might be possible to quantify the extent to which it was necessary to move patients in order to accommodate a newly-admitted patient into a room with others of the

same sex. These movements could be recorded for both four-bed and six-bed rooms. Again, the level of usage achieved by each size of room might be recorded. It was noteworthy that both Mr. Main and Miss Griffin were of the opinion that the flexibility in use of the Falkirk Ward would have been impaired if the intermediate care rooms had had six-beds instead of four. In their experience, the admission of a single patient had often involved three or four other patients being moved to achieve a suitable grouping in one room. Others suggested however that a similar degree of flexibility could be achieved in wards of six-beds provided the hospital was larger than Falkirk Royal Infirmary, that it did not receive emergency patients daily; and provided also there was an increase in the proportion of single bed rooms. A further point made was that the greater the number of patients in one room, the higher was the risk of cross-infection, particularly with the lower ceilings now being provided in ward units and the consequent limitation in cubic space.

11.1.9. The argument advanced in favour of six-bed rooms rested mainly on the fact that circulation areas were reduced. The saving in this respect in a linear design was said to be in the order of 20 per cent. The saving in walking distance was to some extent offset by the greater depth of the six-bed room and was not significant in terms of nurse staffing. The shorter length of the ward containing six-bed rooms resulted in a saving in capital cost, but the inner beds in each bed area would require artificial lighting.

11.1.10. The symposium did not reach a unanimous view on this matter. Some maintained that financial planning was being given precedence over functional planning directed primarily to the privacy and amenity of the patient. Reduced levels of amenity might lead to a greater demand for suites of private rooms. The view was expressed that if capital cost had to be reduced below a point which would provide the Falkirk level of accommodation, the four-bed room might be sacrificed in favour of the six-bed room in preference to the omission of sanitary facilities in each bed area. Others suggested that there was no real conflict between cost economy and functional efficiency. An assessment had to be made which balanced these considerations in order to secure the best value for money, bearing in mind the competing and urgent claims on limited finance. A cost saving could be balanced against functional considerations in the sense that the money released would then be available for additional hospital provision which itself would have a functional value in the treatment of patients.

11.1.11. A further view was that a standard such as had proved satisfactory for an acute ward at Falkirk should not be reduced to permit a lower average type of ward, but that capital savings could be obtained by other means. Ward accommodation of the Falkirk standard might be complemented by simpler ward accommodation suitable for patients who did not need the full range of facilities provided in a modern acute ward. The concept of "minimal care" or pre-discharge wards was mentioned and it was noted that interest in these was increasing. Their use could allow hospital accommodation to be provided in a way that more closely fitted the patient's requirements and level of dependency on medical and nursing care.

11.1.12. Examples of schemes with five, six and seven-bed rooms were referred to. Whether these or plans with four-bed areas were adopted, it was hoped that *"post-hoc"* arguments would not be adduced to justify decisions already made on financial grounds.

Other features

11.1.13. Several features of the Falkirk Ward design were referred to as significant advances in meeting the requirements of patients and staff. They included:-

(a) *Separate toilet and shower facilities for each room.* This provision had made it easier to place patients according to sex; it reduced the number of bedpans used and the number of bed baths which had to be given. It assisted in the treatment of elderly patients (an increasing element in the hospital patient population) and it was a clear advantage to patients not to have to emerge from their bed area into ward corridors when proceeding to the toilet. The shower units as designed had proved even more popular than expected.

(b) *Enclosed rooms with full-width observation panels.* Enclosed rooms gave greater privacy than open bays, and shoulder height observation had allowed a satisfactory compromise between privacy and observation. The use of sliding doors had saved valuable space, and though reasonably quiet in operation, their design might be improved further in this respect.

(c) *Separate nurse working rooms for the intensive nursing care area.* To be effective these rooms had to be in close association with the beds they served, and access to them had to be direct and unobstructed. The nursing staff at Falkirk regarded the provision of these rooms in the intensive nursing care area as a most helpful feature. The intensity of their use had not been tested with "medical" as distinct from "surgical" patients, but nevertheless it was considered that similar criteria should apply.

(d) *Flexible usage between intensive and intermediate care areas.* The Falkirk design had proved highly effective from the point of view of the nurse and doctor. Being on the same ward floor had assisted patients to understand the need to be moved between intensive nursing and intermediate care, and the design had greatly assisted in retaining satisfactory, direct nurse/patient contacts.

2. Engineering Features

11.2.1. Mechanical engineering, in particular ventilation equipment, raised problems for the architect in the design of the project. It was essential to decide the extent of artificial ventilation at an early stage and to incorporate the necessary space in the design from the outset. The more mechanical and electrical equipment, the more chance there was of failure. There was also an increased risk that equipment might deteriorate and work for considerable periods below its designed capacity.

11.2.2. The artificial ventilation system, and other special engineering features of the Falkirk Ward, had added to the capital cost, and higher running costs were involved. It was possible however that the compactness of the deep-plan design would yield some compensating savings in operating costs; for example, a reduction in circulation space and savings in distribution costs could be expected.

11.2.3. The mechanical engineering had permitted the compact deep plan design to be adopted, and designs of this kind were necessary in crowded city sites. The main advantage of the degree of engineering incorporated in the Falkirk design was the control it gave over conditions in the ward. Temperature, ventilation, avoidance of draughts, removal of odour, were all under control to a greater extent than was possible with heated radiators and opening windows. The closed windows permitted by the artificial ventilation cut down outside noise from traffic, etc., which would be an advantage in city conditions. In industrial areas, where air pollution was considerable, the combination of closed windows and filtered artificial ventilation led to greater cleanliness inside wards. The control over air-flow, by extraction from certain areas might be expected to reduce cross-infection. A study of the Falkirk Ward and other wards of modern design was being conducted, and factual information was awaited.

11.2.4. Mechanical engineering should not be considered in isolation, either from a design or cost point of view. Lower ceiling heights in modern designs meant considerable savings in building costs though they raised the question of artificial ventilation. Moreover, if artificial ventilation was not provided in toilet areas, a location on an outside wall together with an opening window would be necessary, and this would restrict design and have cost implications. It was necessary to consider the window area and the design of the windows along with the system of heating and ventilation so that a composite and balanced solution was produced.

11.2.5. The right approach to deciding the extent of mechanical engineering was for the client to state the conditions required in the ward: temperature, humidity and air flow should be defined as far as possible. Further, the requirements should be prescribed separately for different areas of the ward; for example, the requirements for the treatment room and toilet areas would be different for those for the bed areas. The design team as a whole would then consider possible solutions and arrive at the most economical method of satisfying the client's requirements. This approach was more satisfactory than for the client himself to suggest at the outset the extent of mechanical ventilation to be incorporated in the building.

11.2.6. Where a deep plan had to be adopted, it was in the client's interest to exploit the compactness of the building and to secure savings in running costs in, for example, distribution of goods, collection of waste, etc. A compact design offered opportunities for labour saving which must be realised, and these savings could be set against the cost of the mechanical engineering. It had not yet been proved that artificial ventilation was the most economical way of achieving satisfactory conditions. At present the advantages of artificial ventilation were not clearly established.

Windows

11.2.7. It was evident from complaints received at Falkirk that the design of the windows gave rise to a number of difficulties. They were too heavy and produced draughts. Efficient windows should admit air in the right place without draughts. Sliding windows were thought to be satisfactory in this respect and were economical. There is still no clear view on what is an acceptable standard for thermal environment in hospitals, and it is impossible to ensure a reasonable standard of comfort by windows alone. There was however a tendency to confuse ventilation with the function of windows. The prime purpose of windows was to let in light, and other methods could be devised to let in air. On the other hand, when windows let in a lot of sun, there was a greater demand for air. It has also to be accepted that the environment of a ward will not be equally satisfactory for all patients. A patient dressed in pyjamas might feel cold when a fully-dressed patient might feel warm.

Re-circulation

11.2.8. It had originally been intended that at Falkirk the mechanical ventilation plant should incorporate a system for the recirculation of air which would have reduced running costs. The capital cost of such a system had however been too great, and there were difficulties about the development of suitable filters; though in time it should be possible to find a solution.

3. Administrative and Related Questions

Ward and staff management: Salmon recommendations

11.3.1. The Falkirk Ward design provided a suitable setting for the nurse in middle management, as the administrative sister had charge of ward staff in three nursing charges together with a similar responsibility on the second ward floor. This led to an awareness of the problems of managing larger nursing staff complements and to the possibility of deploying staff quickly and effectively to meet changing requirements. The design also enabled the administrative sister to transfer patients between the intensive nursing care and intermediate care areas under her charge. The Falkirk Ward is a suitable type of layout in which the recommendations of the Salmon Committee could be carried into effect. The nursing administrative aspect had proved successful in the new ward which had, although this was not one of its intentions when designed, proved a good experiment for the Salmon recommendations.

Commissioning

11.3.2. It was most important in any new ward that the operating policies should be carefully explained to the staff and fully understood by those who would be working in the unit.

Bed usage

11.3.3. It was noted that the average monthly bed occupancy level had been as high as 92 per cent; and in spite of a decision that no extra beds would be available for emergencies, it had never been found necessary to refuse a patient admission. It was agreed that the high level of bed occupancy had been facilitated by the design of the ward, though the project itself had probably given a stimulus to ward management.

Duration of stay

11.3.4. There had been a definite decline in the average duration of stay. The reduction in sepsis rate which had so far been achieved was probably not the significant factor because of the unfortunate experience with surgeon "C" referred to by Mr. Main; but the improvement now expected would reduce the duration of stay still further. These results had probably been obtained from the more refined gearing of admissions to available facilities that the flexible use of the ward made possible. Waiting time before operations, in particular, had been reduced. Again, the noticeably contented, quiet atmosphere in the ward would help patients to recover more quickly. Early ambulation was encouraged by the dispersed sitting spaces and day areas, and by the proximity of W.C.s to bed areas. If a pre-discharge ward had been available at Falkirk, the average duration of stay in the acute ward could have been still further reduced. During the 24-hour study, for example, it was considered that nine of the 52 patients could have been moved to a ward of that kind.

The development of clinical divisions, conference facilities and secretarial services

11.3.5. It was agreed that this type of ward floor would lend itself to the development of clinical divisions. Clinical resources could be brought together in larger units of this kind and result in more economical and effective deployment of professional skills. A still larger ward floor would permit even better use of such resources. In such a floor it would be necessary to provide a room for a unit secretary, at least one additional staff room and possibly a seminar room which could be used by both medical and nursing staff.

4. Points raised in Concluding Discussion

Topics for further study at the Falkirk Ward

11.4.1. Several suggestions were discussed for the collection of further information at Falkirk. It was noted, for example, that the cost of domestic services had not increased, although the larger number of wash-basins and W.C.s to be cleaned added to the work. It would be useful to know what were the main factors that kept down costs: whether this had been achieved because of better organisation, mechanical ventilation, or because there was a waitress and central dish-washing service. Well-planned domestic service rooms, good equipment and effective team-work among domestic staff had undoubtedly helped to keep costs steady.

11.4.2. Information on the operating costs of the engineering services in the ward could usefully be elaborated. It would be helpful to compare the cost of radiant wall-panel heaters and of radiant ceiling-panel heaters.

Further points raised

11.4.3. Although there had been initial difficulties about visiting hours which meant that the ward

became overcrowded, the position had improved. It would have helped if a waiting room had been provided on the ground floor of the unit where extra visitors over the permitted number could await their turn.

11.4.4. Beds were cleaned in the ward rooms. There was a suggestion that a central bed-cleaning service would have been useful; though difficulties were envisaged over the portering service.

11.4.5. It was apparent that there had been no financial extravagance in the design or specification of the Falkirk Ward; some specifications had been pruned to the absolute minimum that was acceptable. It was suggested that increased building costs would have to be allowed for by increased cost limits, if the advantages of efficient design were not to be prejudiced. Otherwise the tendency would be to over-estimate in order to ensure that rising costs could be absorbed without interfering with design principles.

11.4.6. The design of the ward was intended to be suitable for a variety of "acute" purposes, though not for long-term care of patients at the pre-convalescent stage. It should even be possible to accommodate two small specialties in one 24-bed area. The intensive nursing care area could, for example, be re-designed for school-room purposes in a paediatric ward or for occupational therapy in a geriatric ward.

Summing up

11.4.7. The planning of the Falkirk Ward had been an effective exercise in multi-disciplinary co-operation; and the results of the evaluation showed that the design team had not only anticipated various developments in ward organisation but that their planning assumptions had been very largely fulfilled. The view was expressed that the design of the Falkirk Ward was a safe basis for planning for the next 50 years. One of the gratifying features of the first year of operation was that the vast majority of patients and staff had expressed their satisfaction with the facilities provided, which, taken together, represented a significant advance in ward design.

XII. ORGANISATIONS ASSOCIATED WITH THE FALKIRK WARD UNIT PROJECT

Architects:	Messrs. Keppie Henderson and Partners, 21 Woodside Place, Glasgow, C.3 (in conjunction with Scottish Home and Health Department and Western Regional Hospital Board.)
Structural Engineers:	Messrs. Charles Weiss and Partners, 123 King Street, Hammersmith, London, W.6.
Electrical and Mechanical Engineers:	The Western Regional Hospital Board.
Quantity Surveyors:	Messrs. Jas. D. Gibson and Simpson, 3 Melville Crescent, Edinburgh, 3.
Clerk of Works:	Mr. D. McFarlane, Western Regional Hospital Board.
Main Contractor:	Messrs. Jas. Laidlaw & Sons Ltd., Clydesdale Works, Dalmarnock Bridge, Rutherglen, Glasgow.
Sub-Contractors	
Heating and Ventilating:	Messrs. G.N. Haden & Sons Ltd., 26 India Street, Glasgow, C.2.
Electrical:	Messrs. Jas. Kilpatrick & Son Ltd., Kelvin House, River Cart Walk, Paisley, Renfrewshire.
Plumber Work:	Messrs. Robert Rome & Son Ltd., 18-20 Woodside Avenue, Rutherglen, Glasgow.
Plaster Work:	Messrs. D. Robertson & Son Ltd., 37 Herbertshire Street, Denny.
Tile and Terrazzo Work	Messrs. Diack & Morton Ltd., 30 Abercorn Street, Paisley.
Glazier Work:	Messrs. Daniel O'May Ltd., West End, Falkirk.
Asphalt and Bituminous Felt Work:	The Ruberoid Co. Ltd., 4 Royal Terrace, Glasgow, C.3.
Plasterboard Partitions:	The Expanded Metal Co. Ltd., 339 Balmore Road, Glasgow, N.2.
Smith Work:	Messrs. J. & G. Malcolm, "The Hedges", Camelon, Falkirk.
Heated Ceilings:	Messrs. Frenger Ceilings Ltd., 60 Lorne Street, Edinburgh, 6.

Suspended Ceilings:	Messrs. Wm. Beardmore & Co. Ltd., Parkhead Forge, Glasgow, E.1.
Flooring:	Messrs. Limmer & Trinidad Co. Ltd., 4 Woodside Place, Glasgow, C.3.
Ventilating Ducting:	Messrs. Sun Ventilating Co. Ltd., 206 Springfield Road, Glasgow, S.E.
Insulation:	Messrs. Kitsons Insulating Ltd., 490 Dobies Loan, Glasgow, C.4.
Medical Gases:	Messrs. British Oxygen Co. Ltd., Rosehill Works, Polmadie, Glasgow, S.2.
Medical Equipment Sub-Contractors:	Messrs. Sierex Ltd., 22 Oswald Street, Glasgow, C.1.
	Messrs. Charles F. Thackray Ltd., 1 Queen Margaret Road, Glasgow, W.2.
Patent Glazing:	Messrs. Pennycook Patent Glazing Engineering Co. Ltd., St. Munro Works, Bishopbriggs.

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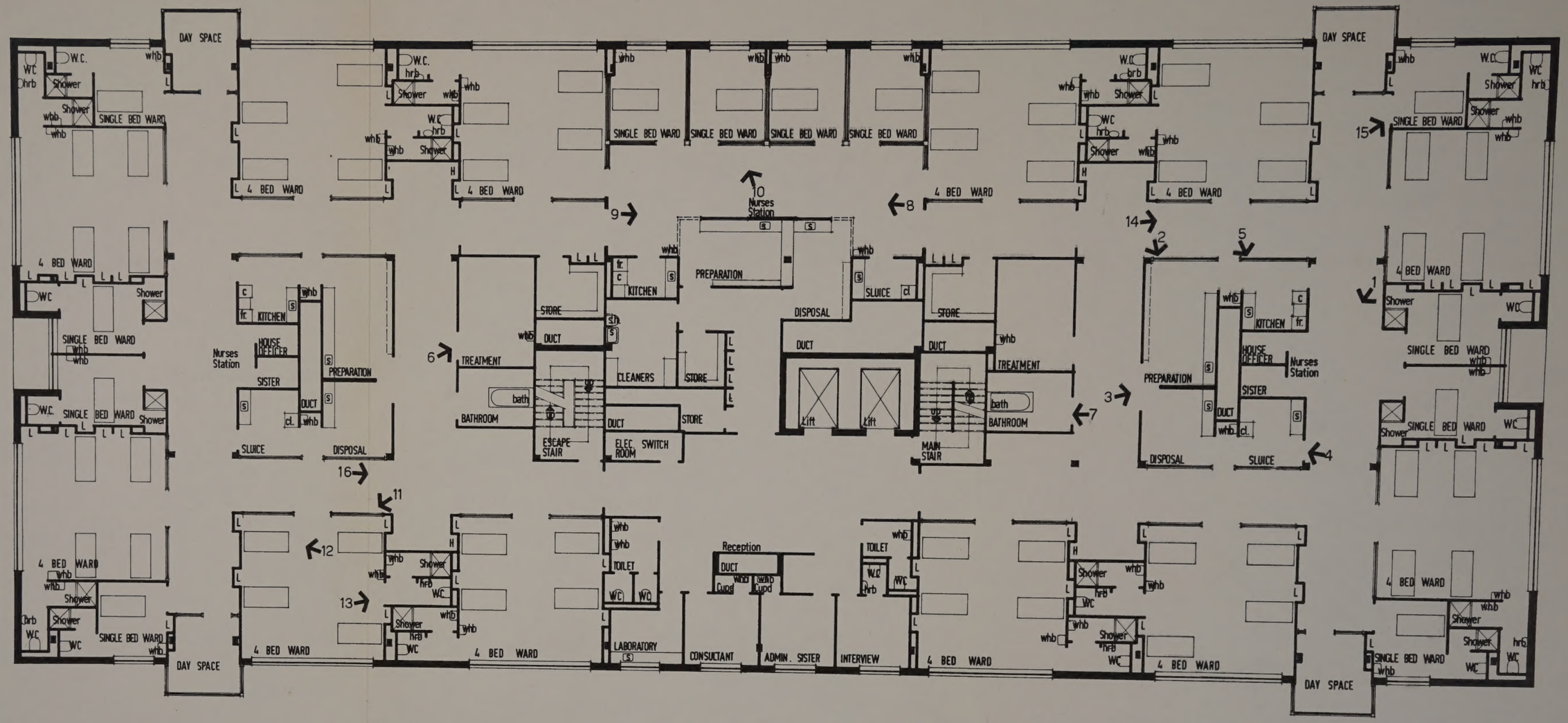
LEGEND :-

whb - wash hand basin.
hrb - hand rinse bowl.
c - cooker.
s - sink.
fr. - fridge.
cl. - clinimatic disposal unit.
s.h. - slop hopper
H - hose reel.
L - patients locker.

6 - photo viewpoint



1st & 2nd FLOOR PLANS.

10 5 0 10 20 30 40 50

Scale of feet.

Hospital Planning Notes

The Scottish Home and Health Department's Planning Committee have prepared interim Notes on various aspects of hospital design, to be issued as a series of Hospital Planning Notes. These interim Notes are intended to provide guidance for those concerned with hospital plans pending the issues of comprehensive bulletins based on longer term studies of particular departments and functions of hospitals. Account is taken in the Notes as they are issued of the information available from recent plans; and in view of the volume of planning work now being undertaken with relatively limited resources the Department hope that these Notes will help to avoid unnecessary duplication of work in preparing plans for units containing elements which have already been the subject of detailed study in connection with other schemes.

Already published

Provision and Design of Casualty and Accident Departments	20p (by post 25½p)
Planning of Central Sterile Supply Departments	15p (by post 17½p)
Ward Design	30p (by post 35½p)
Ward Design—Room Data Sheets	30p (by post 36½p)
Organisation and Design of Out-Patient Departments	75p (by post 85½p)

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